A DISSERTATION ON THE INUTILITY OF THE Amputation of Limbs.

Written in Latin, by M. BILGUER, Surgeon General to the Armies of the King of PRUSSIA. Augmented with the Notes of Mr. TISSOT, Phyſician at LUSANNE.

Now firſt Tranſlated into ENGLISH,

By a SURGEON.

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MDCCLXIV.

TO

DR. PRINGLE,

Phyſician in Ordinary to Her Majeſty, Fellow of the Royal Society, &c.

SIR,

YOUR excellent work on the *Diſeaſes of the Army*, ſo uſeful to phyſicians in general, will always be conſidered as a ſtandard for the practice of thoſe in particular, who are intruſted with the important office of ſuperintending the health of the ſoldiery. Mr. Bilguer has performed, on his part, what you have ſo ably done on yours, in pointing out to his colleagues and ſucceſſors,

the plan which they ought to follow. It has given me pleaſure to tranſlate his Diſſertation, and you muſt derive a peculiar ſatisfaction from the peruſal of it, becauſe, from the extenſive and painful experience you have had of the bad conſequences reſulting from the operation this able Surgeon ſo warmly oppoſes, you can more readily perceive the uſefulneſs and value of this little work. It is therefore my duty to addreſs it to you, and I eagerly embrace ſo favourable an opportunity of thus publicly declaring the ſentiments of eſteem and particular reſpect, with which I have the honor to be,

SIR,

Your moſt humble, and
Moſt obedient Servant,

TISSOT.

Lauſanne,
1 April, 1764.

PREFACE,

By Dr. TISSOT.

AN extract of the Diſſertation, of which I now publiſh a Tranſlation, had given me a very high opinion of it; but on a peruſal of the whole, I found it ſtill better than I had imagined: It ſeemed to me one of the moſt uſeful and beſt executed performances on Surgery, and I hoped it would very ſoon be tranſlated into French.

Eighteen months having elapſed without any ſuch tranſlation appearing, I thought of procuring one. I then endeavoured to find a tranſlator, but failing in that, I determined to do the office my ſelf. I imagined, that, in thus dedicating a few hours of my time to this work, I ſhould do a conſiderable ſervice to many unfortunate people. I

ſhall reſt well ſatisfied if, by rendering this excellent book more common, I prove the means of adding to its influence, and of inducing a great number of ſurgeons, who may now read it, to quit the cruel and fatal practice of amputation, for the method which Mr. Bilguer propoſes, with a degree of ſincerity and preciſion which leaves no room for doubt.

The title of the original is, *Diſſertatio inauguralis medico-chirurgica, de membrorum amputatione, rariſſime adminiſtranda aut quaſi abroganda, quam, pro gradu doctoris medecinæ et precipue chirurgiæ rite conſequendo, die vigeſima una Martii, A. S.* 1761. *In alma Regia Fridericiana ſpeciminis loco, publicæ eruditorum cenſuræ ſubmiſit,* JOHANNES ULRICUS BILGUER, curia-rhœtus *generalis præfectus chirurgorum exercitûs regii Boruſſici.*

This work contains a much greater variety of matter than its title implies, for it not only ſhews the inutility and danger of amputation, by ſeveral arguments, to which many others might be added; but not ſatisfied with levelling a tottering edifice, Mr. Bilguer frames and deſcribes a plan for preventing and curing thoſe accidents, which oblige ſurgeons to have recourſe to amputation;

tion; and this is properly the moſt conſiderable and moſt eſſential part of the performance, which is, in fact, a treatiſe on gunſhot wounds.

I have ſcarcely done Mr. Bilguer juſtice with regard to ſtyle: I hope, however, I have given his meaning, without depriving it of its perſpicuity or ſtrength. This work will begin a new æra in Surgery, and will reach poſterity. I ſhould have been ſorry in any ſhape to have disfigured it.

It will give me very great pleaſure, if the pains I have taken, and the notes I have added, prove agreeable to the author. He may be convinced that, being engaged in buſineſs as I am, his performance muſt have appeared to me extremely well executed, and much wanted, before I undertook to tranſlate it.

I am informed he has lately publiſhed a work on Surgery, in the German language; I am perſuaded it contains much valuable matter: He ſeems to me to have a genius for diſcovering new expedients to leſſen the ſufferings of human kind. I would have given this book the title of a *Manual for the Surgeons of the Army*, which it deſerves to be, were there not already another ſo called,

called *, which, although very little known, is by no means contemptible. The author had, even at that time, remarked that wounds of the tendons are not troubleſome, owing to their want of ſenſibility, that the actual cautery is ſeldom proper; and ſome other facts, almoſt forgotten ſince that time. He deſcribes wounds near the articulations with diſlocation and fracture, he points out the accidents attending gunſhot wounds, and, what deſerves notice, he only admits of amputation in one caſe; namely, that of an incurable mortification, and mentions it as a cruel and doubtful expedient. I ſhall here cite his own words; they plainly ſhew that, if he lived in our time, he would be one of the moſt zealous encouragers of the new method, ſince he was ſo ſenſible of the defects, and grieved at the barbarity of the old. "If, unfortunately," ſays he, "a "mortification, from whatever cauſe it pro-"ceeds, gains ground in ſuch a manner as "to baffle all our care and applications, "there is then no expedient left but that of "taking off the limb; the ſucceſs of which "is very uncertain, for if it be dubious in

* *Le Manuel du Chirurgien d'Armée*; or, The Art of methodically curing Gunſhot Wounds, &c. By L. L. M. C. Printed for Houry, at Paris. My edition is the ſecond, publiſhed 1693.

"a health-

" a healthful ſubject, it muſt be much more
" ſo in one which is otherwiſe: It is, how-
" ever, the only method, dreadful as it is,
" of putting aſtop to the ailment, and ſav-
" ing the reſt of the body. This never-
" theleſs ought not to be done, except when
" the conſent, age and ſtrength of the pa-
" tient permit us to try ſo dangerous an
" experiment."

This author's manner of thinking is very far from being eſtabliſhed as might be wiſhed, amputations being ſtill too frequent. Mr. Bilguer's work ought at this time to be ſo much the more favourably received, as a celebrated company, whoſe deciſions ought to have great weight in matters relating to ſurgery, has formally declared, about ſeven years ago, *That amputation is abſolutely neceſſary in gunſhot wounds, complicated with fracture of the bones*; and have left unfortunate wounded men no other alternative, but that of loſing the injured limb on the ſpot, or a few hours later. That line of Juvenal ſeems very applicable on the occaſion:

Nulla unquam de morte hominis cunctatio longa eſt.

A

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* It was rumoured at Paris during the war, that the King of Pruſſia forbid the mutilation of his ſoldiers from other motives than thoſe of humanity. Idle people ſpent their time in declaiming againſt ſuch barbarity, and thus ignorantly prejudiced the minds of people againſt Mr. Bilguer's method. I have heard able ſurgeons hint this objection, when I ſpoke to them concerning the preſent work. They acknowledged, nevertheleſs, that amputations had been too common in the French armies. I hope the publication of this little book will have two effects; the firſt is, to re-eſtabliſh the truth, and the ſecond is, to awaken in thoſe ſurgeons, the feelings of humanity.

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A DIS-

A

DISSERTATION

ON THE

Inutility of Amputation.

HAVING reſolved ſome little time ſince to publiſh in this learned univerſity a Diſſertation which might ſerve as a ſpecimen of my Medical Acquirements, the ſubject which appeared the moſt ſuitable to my purpoſe, is one, that may improve the art of ſurgery, which I practiſed for ſeveral years during the heat of the late bloody wars, and may at the ſame time wipe away the old aſperſion, firſt broached at Rome againſt Archagates, and ſo often repeated ſince, that ſurgeons are executioners, who cut and burn without mercy.

The cutting off a limb being the ſevereſt means employed in ſurgery for the relief of

mankind, an operation which every one beholds with horror, I cannot, I imagine, more effectually accompliſh my deſign, or do a greater ſervice, than by demonſtrating, *that the caſes wherein amputation is neceſſary, are much leſs frequent than has been hitherto ſuppoſed, and that it may even be almoſt totally diſpenſed with.*

SECT. II.

MY firſt thoughts on this ſubject aroſe from obſerving what paſſed under my own inſpection in the military hoſpitals.

In the firſt place I remarked, that in a very great number of caſes, where amputation was judged neceſſary by the phyſicians and ſurgeons of the army, and even by the wounded themſelves, in order to preſerve life, it ſeldom or almoſt never anſwered the end.

In the ſecond place, I ſaw and had under my immediate care, a great number of patients whoſe limbs had been carried off by cannon balls, and in ſuch a manner too, that all thoſe who adhere to, and are afraid to deviate from eſtabliſhed rules, would have performed a freſh amputation on the remaining

ing ſtumps, whom I cured, as far as they were capable of being cured, without having recourſe to ſuch diſagreeable means.

And laſtly; many others, whoſe limbs were not intirely ſeparated off, but ſo much detached, wounded, ſhattered and contuſed, that the ableſt ſurgeons deemed it neceſſary to take them wholly off, were nevertheleſs, by my endeavours, contrary to the general opinion, cured without amputation.

SECT. III.

THIS ſucceſs, partly owing to the efforts of nature, and partly to the means employed by art, ſtrongly encouraged me almoſt never to have recourſe to amputation, but to try every kind of remedy, internal as well as external, calculated to preſerve the lives as well as the limbs of the unfortunate ſufferers. My firſt attempts, ſo far from being unfavourable, confirmed me more and more in the opinion, that parts which have ſuſtained the moſt conſiderable injuries, will much oftener get well than what is commonly believed: And although this opinion does not ſeem to be countenanced by many eminent phyſicians and ſurgeons; although I do not flatter myſelf I ſhall be able to induce

them to alter their ſentiments, I hope nevertheleſs, that ſome others, encouraged by my example, and this account of my ſucceſs, will have the courage to follow the ſame method, and that their authority may afterwards contribute to convince the moſt incredulous.

SECT. IV.

BUT ſuppoſing, what I do not apprehend can be the caſe, that all the gentlemen of the profeſſion ſhould agree in declaring my method abſolutely uſeleſs, the reſt of mankind at leaſt, will be obliged to me for my endeavours to mutilate the wounded as little as poſſible; as moſt people are ſhocked at the mention of any amputation, or at the ſight of a poor creature who has loſt an hand, an arm, a foot or leg, wretchedly crawling along upon crutches or a wooden leg; and conſider the total privation of a limb, as a much greater misfortune than when it is preſerved, though perhaps unſhapely, and uncapable of performing ſeveral of its primitive functions. If one reflects how much every body dreads the pain occaſioned by the ſlighteſt inciſion, he will eaſily conceive the degree of horror a perſon muſt feel at the thought of amputation,

and

and why many patients chuſe rather to die than to ſubmit to it *. Hence it is ſo uncommon to find men, like count Mansfeld, ſo famed in the war that laſted thirty years, who cauſed his wounded arm to be taken off amidſt the ſound of trumpets and beating of drums; or like the country fellow, whom Dr. Schaarſchmid, late an eminent phyſician at Berlin, mentions in his collection of obſervations and remarks on phyſic and ſurgery, who cut off his own mortified leg with a ſaw, very unfit for ſuch an operation †.

* I would not chuſe to lay much ſtreſs on this argument; for if one weighs the circumſtances of pain, the amount of what the patient ſuffers from the treatment neceſſary for ſaving the limb, will often be equal to that ariſing from amputation. But the two ſtrongeſt reaſons for prefering Mr. Bilguer's method is, the ſaving the limb as well as the life of the patient; the loſs of which is often occaſioned by amputation, but never by the pain of an inciſion. It is alſo true, that pain when ſlighter, though longer continued, is more eaſily ſupported by the patient. TISSOT.

† To theſe inſtances may be added, that of the ſon of Thomas Koulichan, a captain in the Auſtrian ſervice, who, being wounded in the leg, and the bones ſhattered, in one of the latter battles of the war, held a candle with one hand and extracted the ſplinters with the other. He exhibited many other proofs, not only of courage in the field, but alſo of that fortitude in bearing pain which is very different from the other, and much more ſeldom met with. TISSOT.

SECT. V.

BUT leſt I ſhould be charged with being weakly influenced by the cries of the patient, and with wanting that kind of fortitude which Celſus * thinks requiſite in a ſurgeon, in treating of this operation, I ſhall take it for granted that the patients are men like thoſe I have juſt now mentioned, and that an inordinate deſire of life, an uncommon ſtrength of mind, religion, and other moral reaſons, induce them to conſider pain as nothing, when it affords them any hope of preſerving life.

It is foreign to my plan to inquire who was the firſt who attempted this operation,

* *Celſus de re medica*, l. 7. præf. Nevertheleſs Mr. Dionis, in his courſe of operations, (*Demonſtr.* 2. *Art.* 9.) acknowleges, that even the moſt intrepid ſurgeons tremble at the inſtant they are going to perform this operation. Of all the operations, ſays he, that which occaſions the greateſt horror, is the amputation of a thigh, a leg or an arm. When a ſurgeon is about to take off a limb, and reflects on the cruel means he muſt employ, he cannot help feeling a tremour, and pitying the misfortune of the poor patient, who is under a fatal neceſſity of being deprived, for life, of a part of his body. And in another place he ſays, This operation ought rather to be performed by a butcher than by a ſurgeon.

or to trace the hiſtory of it in the works of the ancients. I ſhall only take notice, that ſuch wounded men as recovered, after having loſt a limb by ſome accident, without doubt, ſhewed the poſſibility, and ſuggeſted the firſt hint of trying this operation. Neither ſhall I dwell upon the various methods of performing it from the infancy of the art to the preſent time; they are deſcribed in other books *, and I do not purpoſe giving a compleat treatiſe on amputation. I ſhall not even touch upon what is already generally known on this ſubject, but as little as I poſſibly can: This is the beſt way of handling any particular point; and I hope all thoſe who pay more regard than I do to ſcholaſtic form, will pardon my inattention to regularity of method and ſtile, when they are informed how much my time is engaged; others will excuſe me, when they call to mind the remark of Celſus, that diſeaſes are cured by proper remedies, not by a diſplay of eloquence.

SECT. VI.

TO prove what I have advanced, I ſhall begin with enumerating thoſe accidents for

* Memoirs of the Royal Academy of Sciences, 1732. Art. 7.

which amputation has been hitherto deemed neceſſary. I ſhall reduce them to ſix.

Firſt, A mortification, which ſpreads till it reaches the bone.

Secondly, Any limb ſo greatly hurt, whether by fracture or dilaceration, hat there is room to dread the moſt fatal coſequences, a mortification and death.

Thirdly, A violent contuſion of the ſoft parts, which has at the ſame time ſhattered the bones.

Fourthly, Wounds of the larger veſſels, which convey the blood into the limb, either, as the only means of ſtopping the hemorrhage, or through the apprehenſion the limb ſhould periſh for want of nouriſhment.

Fifthly, An incurable caries of the bone.

Sixthly, If any part is either attacked with a cancer, or is in danger of being ſo, it is cuſtomary to take it off.

I ſhall treat of theſe different accidents more or leſs particularly, in proportion to the number of obſervations I have made on each

each of them, as no method of cure, however doubtful and alarming, ſhould be rejected, till a better can be pointed out. Thus, this treatiſe contains only, in effect, an account of the methods I ſucceſsfully employed in the military hoſpitals, for the relief of the above diſorders; together with a few obſervations, and ſtill fewer hypothetical reaſonings, which induced me to condemn the uſe of amputation.

SECT. VII.

I SHALL begin with an account of the means I make uſe of, internal as well as external, when a limb is mortified, the effects of which have convinced me, that in ſuch caſes amputation is not neceſſary; and here I ſhall firſt gratify the curioſity of thoſe readers who, doubtleſs, are deſirous to know what I have learned from the extenſive opportunities I muſt neceſſarily have had, with reſpect to the uſe of the Peruvian bark.

Experience has taught me, that this admirable medicine is poſſeſſed of a ſingular and ſpecific virtue in mortifications.

I know that ſeveral phyſicians and ſurgeons only recommend it in thoſe which proceed

proceed from weakneſs. I have heard it reported by others, that they found it of little ſervice after the famous battle of Dettingen *. But perhaps the other circumſtances, with regard to the treatment of the patient,

* Mr. Ranby, however, who was one of the ſurgeons of the Britiſh troops at the time of the battle of Dettingen, lays great ſtreſs upon the bark: It is true, that in one of his caſes, having ordered it to an officer of ſeventy years of age, whoſe leg had been amputated, *on account of his ancle, with the neighbouring parts, having been terribly ſhattered by a cannon ball*, it did not keep the ſore from growing worſe, or prevent the patient's death. But that we may form a juſt eſtimate of the merit of the bark, and the effects of amputation at the ſame time, it will be neceſſary to compare this caſe with the one which precedes it. This compariſon will, I imagine, be of uſe.——I ſhall quote the author's own words. "An Auſtrian officer, who had his hand miſerably ſhattered by a cannon ball, was, by ſome accident, left in a wood near the field of battle, deſtitute of any manner of help, from Thurſday till the Sunday following, when he was brought to Hanau. The next morning I was carried to ſee him, and to aſſiſt in taking off his arm. On viewing it, I found it mortified almoſt to the elbow, with a great ſwelling and inflammation quite up to the ſhoulder. As it was by no means adviſeable to attempt an amputation in ſuch circumſtances, I propoſed giving him the bark; which being no ways objected to, he entered upon immediately. The next day he was rather better: But, on the third, was evidently ſo. The inflammation was leſs, the ſwelling began to ſubſide, and the edges of the mortification were ſeparating. The arm was fomented and wrapped up in the oatmeal and ſtale beer poultice, with theria-

ca:

patient, did not contribute to promote thoſe good effects which I always obſerved attended it when judiciouſly adminiſtered. And I make no doubt, but every practitioner who, in preſcribing it in caſes of mortification, obſerves the rules laid down by Dr. Pringle, Dickins, Wade, Cheſelden, Douglas, Ruſhworth, Amyand, Shipton and ſome others,

ca: And the dreadful ſymptoms which forbad the operation, were now ſo much abated, that his ſurgeons did not at all heſitate to take it off. But this was done to very little purpoſe; for three or four days after the amputation, being attacked with convulſions, he expired."

I ſhall here ſubjoin five queſtions.

Would Mr. Bilguer have amputated in theſe two inſtances?

Would not his method have ſaved both theſe patients, eſpecially the laſt?

Does not amputation ſeem to have contributed to their death?

Does it not evidently appear, that in the latter of theſe two caſes, amputation deſtroyed the good effects of the bark, which ſeemed to conduct the patient to a ſpeedy cure; and that in the former caſe, the bark had not power ſufficient to repair the miſchief occaſioned by the amputation?

Does it not follow from theſe two obſervations, that however ſalutary the effects of the bark may be, thoſe of amputation are hurtful in a greater degree? TISSOT.

will find it very efficacious. I do not mean, nevertheleſs, that it ſhould be conſidered as the only internal medicine; there are, doubtleſs, other bitters which are ſometimes extremely proper on theſe occaſions. I muſt add, that the bark appears to me to poſſeſs that quality which Celſus requires in medicines, whether in a ſolid or liquid form, adapted to the cure of a mortification, to bind the belly moderately, and brace the whole ſyſtem. After having treated of the external applications, I ſhall point out the method in which I adminiſtered the bark.

SECT. VIII.

WHENEVER a mortification attacks any part of the body, whether it be owing to an outward hurt, or proceeds from an internal cauſe, as often happens in perſons afflicted with the ſcurvy, dropſy, a vitiated ſtate of the blood, phagedenic ſores, or very aged people, who begin, as it were, to die in the extremities: Whenever, I ſay, the mortification begins to appear, it requires immediate help. We muſt begin by making inciſions on the part affected, in order to procure a diſcharge of the corrupted matter, and to aſſiſt the action of the medicines.

I make

I make long inciſions, not only on the mortified parts, but on thoſe adjacent, which would ſoon be ſo; I make ſeveral of them, as nearly as the large trunks of the blood veſſels, and more conſiderable branches of nerves will allow, not above an inch diſtant from each other. We ought always to cut to the quick; and if the bone be affected, the perioſteum muſt be cut through, and the bone laid bare. Theſe inciſions ſhould follow the direction of the greater number of fibres of the muſcles that happen to be thus cut upon; but when the gaſtrocnemii, the glutei or deltoid muſcles have been wounded by a ball, they muſt be cut croſs-ways, otherwiſe convulſions, particularly the ſpaſmus cynicus, will probably enſue. Several aponeuroſes, eſpecially that of the biceps, ought likewiſe to be cut tranſverſally: It is true, if the longitudinal inciſions are ſufficiently long and numerous, they take off the tenſion of theſe membranes ſo much as to render the tranſverſal ones unneceſſary.

Neither ought the tendons to be ſpared; they muſt be boldly cut through tranſverſally.

If a wound, or any other ailment, happens near the articulations, I alſo, without fear,

fear, make large inciſions through the ligaments.

It will eaſily be underſtood that theſe inciſions muſt differ from each other in length and depth; they muſt be longer in thoſe parts of the ſore where the diſeaſe has ſpread the wideſt, and ſhorter in others. Both muſt be more ſuperficial at their extremities, and deeper in the middle, in the place where the complaint began, and where the mortification reaches deepeſt.

The number of inciſions, and their diſtance, muſt alſo vary, as they may be found neceſſary; ſo that a ſkilful ſurgeon may make three, four, ſix or eight, as the caſe may require.

It is obvious, that in an operation of this kind, a ſurgeon ſhould not be too precipitate; and when he does not know the depth of the ailment, he ſhould not go too deep with his inciſion: he may repeat it if he finds he has not reached the quick.

SECT.

SECT. IX.

AFTER theſe inciſions are made, we muſt carefully examine how far the part which is abſolutely mortified, and which it is impoſſible to reſtore to life, may reach. This may be diſtinguiſhed by the ſtench which exhales from it, by its change of colour, and want of feeling. Theſe mortified parts ought immediately to be ſeparated from the ſound, and removed by means of a biſtory, in the ſame manner as one muſcle is divided from another in an anatomical diſſection. In order to do this, the dead fleſh muſt be cut through croſs-ways, which puts the patient to no kind of pain. But care muſt be taken in this operation, not to ſeparate ſuch parts as may be ſomewhat affected by the mortification, yet not totally corrupted, as it often happens, after the removal of what is entirely dead, that they recover, by proper aſſiſtance, their natural ſtate.

In making theſe inciſions, we ſhould take all imaginable care, as I have already remarked, not to wound the larger blood veſſels or more conſiderable nerves; for this purpoſe, the gangrened parts which lie near them, ſhould be ſeparated with great caution:

tion: It is even better to leave behind a ſmall portion of the mortified fleſh which may adhere to them, and to truſt for its ſeparation to the enſuing dreſſings, which they will not fail to accompliſh. The reaſon for this rule is, that we often ſee the veſſels remain ſufficiently ſound, while the other parts are very much corrupted. We find for example, in the arm, near the joint of the elbow, near the wriſt, and even in the lower extremities, the veſſels intire, although the mortification of the parts which ſurround them be ſo conſiderable, as to oblige us to make our inciſions to the bone; and it is theſe veſſels, after the extirpation of the dead parts, that muſt keep up life in thoſe which remain: We ought to preſerve the greateſt number we can, not only of the larger veſſels, but even of the ſmaller ones: It was with a view to this particular, that I recommended not to make our inciſions raſhly, but with a good deal of caution, both with reſpect to the place where they were made, their direction and their diſtance. In operating with this circumſpection, we ſhall avoid incurring the cenſure of Platnerus, who remarks, that we ought not to ſeparate the dead from the ſound parts with violence, "Becauſe," ſays he, "inciſions which cauſe "an effuſion of blood, often renew the in-"flammation." Now in my method, there

is

is neither any violence, nor inciſions attended with blood.

SECT. X.

WHEN the inciſions are made, if the neighbouring parts appear ſomewhat tainted, we muſt, by gentle compreſſion, ſqueeze out the corrupted humour which may harbour there, and wipe it off with a bit of ſoft linnen rag. Afterwards, whether it may have been neceſſary to extract, either with the fingers, a ſcalpel, or with the inſtrument called a myrtle leaf *, any bony ſplinters too much detached from the ſubſtance of the bone itſelf to hope for a re-union, a circumſtance which often requires a conſiderable dilatation of the fleſhy parts; or whether the bones appear carious, or ſpoiled in any other ſhape; or, laſtly, whether we may have been obliged to make deep inciſions, even to the bone: In all theſe caſes, we muſt at firſt employ ſuch external applications as are proper for the bones, and for the ſoft parts that have a tendency to mortification, although they may have diſcharged a ſufficient quantity of blood during theſe operations.

* See Dionis's ſurgery, page 18. 4th edition.

The bone, whether the perioſteum be ſound or deſtroyed, muſt be dreſſed with the following medicine: *Of frankincenſe, maſtick, ſarcocolla and myrrh finely pounded, true balſam of Peru, and genuine eſſential oil of cloves, of each equal parts; of balſam of Fioraventi, as much as may, in mixing all the ingredients over a very gentle fire, form a thin liniment*; which muſt be warmed when uſed, and which muſt be poured plentifully into the wounds I am ſpeaking of, ſo that the bone may be well moiſtened therewith.

This medicine is of ſervice in all caſes where the bone is affected. When the bone is covered with it, ſome dry lint may be laid over it, and the ſoft parts dreſſed by ſprinkling upon this lint a powder compoſed of *an ounce of myrrh finely pounded, half an ounce of ſal ammoniac, camphor and nitre, each a dram.* After the firſt layer of lint is thus covered, freſh lint muſt be applied, and again ſprinkled with the powder, till in this manner the cavity of the wound is quite filled up with alternate layers of lint, and this vulnerary powder.

SECT.

SECT. XI.

IF the bone is not affected, or the perioſteum laid bare, the balſam or thin liniment may be omitted. And the dreſſings may only conſiſt of the layers of dry lint and vulnerary powder applied alternately.

SECT. XII.

BESIDES the dreſſings I have mentioned (§ X. and § XI.) for theſe kinds of wounds, we muſt likewiſe make ſlight ſcarifications upon the neighbouring parts, and ſprinkle them with the powder; after this treatment, embrocate all the ſores with oil of turpentine, and then lightly bandage up the whole with plain linnen cloth, which muſt be kept moiſtened, night and day, with warm fomentations.

SECT. XIII.

IT is in following this method only, (§ X, XI, XII.) that theſe fomentations, ſo much recommended both by the antients

and moderns, will be found truly ſerviceable and efficacious. Mr. Heiſter has collected a ſufficient number of theſe forms, in treating of mortifications, in his excellent ſyſtem of ſurgery, which is in every body's hands. It will be an eaſy matter for a ſurgeon, who underſtands the nature of the ailment and the quality of the medicines, to ſelect ſuch as will be moſt ſuitable to the caſe he happens to treat. Thus, for example, the fomentation conſiſting of a *pint of lime water, three ounces of camphorated ſpirit of wine, and an ounce or half an ounce of ſal ammoniac,* is very uſeful in mortifications which are the conſequences of high inflammation, as it relieves the inflamed parts that lie round thoſe which are already mortified. The ſame effect may be obtained from the fomentation made with the *balſam of life*; namely, *ſoap, ſalt of tartar, and oil of turpentine, mixed and diſſolved in lime-water*; and from the *cataplaſm*, compoſed of the herbs called *ſpecies pro cataplaſmate*, and *venice ſoap and ſaffron* added thereto *.

* Theſe two laſt applications are not in Heiſter: The *ſpecies pro cataplaſmatic*, conſiſts of *yarrow, wormwood, water germander, ſouthernwood, chamomile, ſage, hyſop, rue, elder, St. John's wort, and red roſes.*

It is quite unneceſſary to make uſe of all theſe ingredients at one time. TISSOT.

If,

If, without any conſiderable inflammation preceding, a part is found mortified, or a beginning mortification appears attended with a ſwelling, which frequently happens to dropſical people, to thoſe afflicted with œdematous tumours, and to aged perſons, and whenever the ailment proceeds from a defect rather than an exceſs of the vital motions; the following fomentations are more proper.

1. *Take of water germander, wormwood, ſouthernwood, rue, of each two handfulls; chamomile flowers, one handfull: Boil them together, and to two pints of the ſtrained liquor add four ounces of treacle ſpirit, two ounces of venice ſoap, and half an ounce or even an ounce of ſal gem.*

2. *Take of water germander, wormwood, feverfew, of each two handfulls; of mint and ſouthernwood, of each a handfull: Boil them together in oxycrate, ſo as to have four pints of the ſtrained liquor, to which may be added half an ounce of ſal gem, and afterwards from two to four ounces of treacle ſpirit.*

3. *Take of martial ball* * *two ounces, ſal ammoniac one ounce; diſſolve them in about eight pints of ſpring water, and add two pints of rectified ſpirit of wine.*

4. *Take of crude alum, and white vitriol, each two ounces and two drams; lytharge of ſilver and myrrh, each an ounce; Aleppo galls, two ounces; juniper and bay berries, each an ounce; ſavin and rue, each two pugils; oak leaves, a handfull and a half; verdegris, half an ounce; camphor, two drams; calamin, ſix drams* †. *After*

* As the compoſition of the martial ball may not be generally known, I ſhall deſcribe it in this place: *Take of filings of iron one part; white tartar two parts: Let them be reduced to a fine powder, and put into a matraſs with as much French brandy as will ſwim about an inch above the powder; exhale to dryneſs, either in the heat of the ſun or in that of a water bath. Pour freſh brandy upon the remainder, and evaporate them in this manner ſeveral times ſucceſſively, till the maſs appears reſinous; then form it into balls nearly of the bigneſs of an egg.*

I do not exactly know what quantity Mr. Bilguer means by *ſextarius*; that meaſure, among the ancients, contained twenty-four ounces, but here I believe it denotes ſomewhat leſs. If we ſuppoſe it to be about a pint, the medicine will be extremely good.

† This compoſition is commonly called *ſpecies pro decocto nigro*, or the ſpecies for the black decoction.

having

having mixed and reduced all theſe ingredients to powder, let two ounces of the compoſition be boiled with four pints of water, or with two of water and two of vinegar.

The following embrocations applied to parts already mortified, will ſtop the further progreſs of the mortification; where it is juſt beginning they will prevent it, and will alſo help nature to ſeparate the dead parts from the ſound.

1. *Spirit of wine, three ounces; myrrh and aloes powdered, of each half an ounce; Ægyptian ointment, three drams* *.

2. *Vinous decoction of ſcordium, twelve ounces; vinegar of rue and of roſes, of each four ounces; ſpirit of treacle, three ounces; and one ounce of ſal ammoniac.*

3. *Lime water, four pints; treacle ſpirit, or that of feverfew, two pints; white wine vinegar, one pint; elixir proprietatis, ſix ounces; Ægyptian ointment, two ounces.*

* In uſing the external vulnerary medicines, in which aloes is an ingredient, it muſt be remembered, what Mr. Bilguer remarks in another place, that they often prove purgative.

4. *Decoction of elder flowers, ſix ounces; wine, eight ounces; vinegar, camphorated ſpirit of wine, treacle ſpirit, or that of feverfew each two ounces; ſpirit of ſalt, two drams.*

Laſtly, in order to ſoften the parts, ſeparate the ſloughs, and promote ſuppuration, the following application may be uſed.

Water germander, two handfulls; mallows and marſhmallows, each a handfull; flower of linſeed, three ounces; Venice ſoap and ſal ammoniac, of each two ounces; linſeed oil, an ounce. Let theſe ingredients be boiled together, in vinegar and water, to the conſiſtence of a poultice.

It may be in general obſerved with regard to fomentations, that ſuch as are emollient are ſerviceable, when hard dry cruſts prevent a diſcharge; thoſe which abound with acid, when there is a conſiderable degree of putrefaction; and, laſtly, thoſe which are ſpirituous, ſaline or ſtrengthening, are moſt proper when ſwellings are flabby, and the body abounds with aqueous humours.

SECT.

SECT. XIV.

THE diligent uſe of theſe fomentations will alter, in the ſpace of twelve hours, the condition of gangrened wounds for the better; at the end of which, the lint and vulnerary powder, with which they were filled, may be removed, and at the ſame time, all the detached pieces of mortified fleſh may be extracted, and the ſame dreſſings (§ X, XI, XII.) applied, which muſt be renewed every twelve hours. The third or fourth dreſſing, the wound will diſcharge matter of a favourable aſpect, ſo as to afford hopes of a cure: Then it will only be neceſſary to give the bark internally, and to dreſs the ſore in the manner I ſhall mention by and bye. § XVI.

SECT. XV.

THE bark may be given by itſelf, in powder, or made into an electuary with rob of elder, or with the ſyrup of quinces, cinnamon, orange-peel, or any other cordial ſyrup; if it purges when taken in ſubſtance, it muſt be adminiſtered in the infuſion or extract.

If

If the fever be ſtrong, the heat conſiderable, and the patient thirſty, the bark will be of no ſervice *; but recourſe muſt be had to medicines which may abate the fever and allay the heat, ſuch as are commonly called temperants.

If the bark be judged neceſſary, it may be given in doſes of half a dram or two ſcruples, at firſt every hour, afterwards every two hours, and at length, once every three or four hours: To each doſe may be added a few drops of ſpirit of ſea ſalt, or of dulcified ſpirit of vitriol, or a few grains of alum or catechu. If the patient be very weak, a ſmall glaſs of ſome acid wine may be ordered with the medicine, ſuch as Rheniſh, Neckar or Moſelle wine, &c. When it is thought proper to promote perſpiration, an infuſion of chamomile may be drank, as is recommended by Dr. Pringle. Let the ſtrength be ſupported by the plain regimen, directed by that phyſician in the ſame treatiſe.

* Mr. Bilguer might have even ſaid hurtful; the only true temperants are, repeated bleedings and the acids, which are preferable to nitre, which is not very proper wherever there is reaſon to apprehend a mortification. Abſorbents, which in ſome parts of the country where Mr. Bilguer writes, are ſtill ranked in the claſs of temperants, are very hurtful in the preſent caſe, and never afford any relief to wounded patients.

Let

Let the drink be water and vinegar, weak veal and chicken broth, gruels of barley or oatmeal, acidulated with vinegar or juice of lemons, &c. I have not room, in this place, to enter into a more particular diſcuſſion.

SECT. XVI.

I NOW return to the external treatment. When the dreſſings deſcribed, § X, XI, XII. have begun to procure a diſcharge of matter, the uſe of the vulnerary powder and oil of turpentine muſt be laid aſide; but we muſt continue to aſſiſt and promote the ſuppuration for ſeveral days, ſometimes even to the eighth; by dreſſing with the digeſtive, I ſhall hereafter mention, by keeping the parts conſtantly covered with emollient fomentations, and by avoiding to cleanſe the wound too much, either by too ſtrong compreſſion, or by wiping it with too much exactneſs each time of dreſſing. We ought to be very much on our guard with reſpect to theſe two laſt points, till there be a ſufficient ſuppuration; afterwards a ſomewhat ſtronger compreſſion may be allowed, and the ſore may be wiped with more exactneſs, but ſtill, nevertheleſs, but very gently. For ſuppuration is the work of nature, an effort of

of the ſound parts, by which they throw off whatever is vitiated and noxious; and it is the buſineſs of the ſurgeon to aſſiſt this ſalutary operation, by removing, with his inſtruments, ſuch parts as are intirely corrupted; but this ought to be done, at leaſt as much as poſſible, without cauſing any diſcharge of blood *. He muſt not, however, confine his attention to the ſoft parts only, but muſt have an eye likewiſe to the bones; and, after having examined them carefully, and even made what dilatations may be neceſſary for this examination, he muſt remove, at each dreſſing, whatever is carious, and all the ſplinters that can be extracted without violence; after which they may be covered with the balſam for the bones, § X. and the ſoft parts dreſſed, as circumſtances may indicate, either with dry

* This precept, of which the very reverſe is but too frequently practiſed, is of very great conſequence: It is founded upon this, that a diſcharge of blood proves that an inciſion has reached the quick; now every ſuch inciſion produces an inflammation, which retards the ſuppuration already begun, and hence we interrupt this operation of nature which we meant to promote, and, as it is the means of preventing a mortification, whatever interrupts it contributes to the diſeaſe: It cannot, therefore, be too often repeated, that in general, inciſions which cauſe a diſcharge of blood, ought never to be practiſed after a ſuppuration is begun. TISSOT.

lint,

lint, or with ſome digeſtive ointment, eſpecially that which I ſhall deſcribe bye and bye, quickened with a little eſſence of myrrh.

All theſe dreſſings ſhould be finiſhed as expeditiouſly as poſſible, in order not to leave the ſore too long expoſed to the air, eſpecially the cold air, which may be avoided by dreſſing the patient in a room moderately warm, and by holding a few live coals near the part which is dreſſed.

When there is a large ſuppuration the wound muſt be dreſſed twice a day, beginning always, as I ſaid before, with carefully examining the ſtate of the bone, with removing ſuch ſhivers as are ſeparable, with raſping and trepanning where there may be occaſion; leaving to nature, aſſiſted by the balſam, § X. what cannot be extracted by manual aſſiſtance.

The digeſtive ointment for the fleſhy parts, which I commonly uſe, and which I have already recommended, is the following; *Oil olive, half a pint, and an ounce of red ſaunders boiled together, till the oil acquire a deep red colour; when it is ſtrained, add a pound of yellow wax, and a pound*

and a half of turpentine; when the whole is mixed and melted together over a gentle fire, a little balſam of Peru may be added.

This medicine is principally of ſervice in caſes where, on account of the proximity of the bones, we would not chuſe too plentiful a ſuppuration.

SECT. XVII.

IT was probably by ſome ſuch application, that S** G**** cured a man whoſe arm was mortified, and whom the phyſicians and ſurgeons had given up; a cure which appears to me much leſs wonderful than what is imagined. The phyſicians and ſurgeons deſpaired of his recovery, and quitted him, becauſe he would not ſubmit to amputation, at the very time when, doubtleſs, the ſeparation of the ſound and mortified parts began to take place, owing either to the force of nature or the medicines they had adminiſtered, and when granulations of new fleſh began to ſhoot. It was eaſy for S** G****, called in at this inſtant, to effect a cure, by means of his quieting powders and balſam. What is moſt aſtoniſhing in this caſe, and deſerves at the ſame time to excite our indignation,

is the obſtinacy and the cruelty of the phyſicians; but they were ſufficiently puniſhed for it.

SECT. XVIII.

THIS is not the only inſtance of patients in whoſe caſes phyſicians and ſurgeons have pronounced amputation to be unavoidable, and who, upon their refuſing to ſubmit to it, have afterwards been cured by very ſimple treatment. This ought to be a leſſon for us never to be too precipitate in having recourſe to this operation *.

But what muſt be done, they will ſay, when every medicine has failed? Is it not better, in ſuch a ſituation, to try a doubtful remedy, as Celſus expreſſes it, than to do nothing?

As what is called a doubtful remedy, is for the moſt part no remedy at all, I look upon ſuch an argument as very fallacious; I ſhall explain, what I think on this point.

* I hardly ever knew any old officers who have not been witneſſes of ſome examples of this kind; and I have ſeen ſeveral people who have themſelves been in ſuch a ſituation.

Every

Every mortification is the conſequence either of ſome internal morbid cauſe, or an external accident. In the firſt caſe, amputation can be of no ſervice while the morbid cauſe remains; and who can hope, in ſo ſhort a time, to remove a conſumption, the ſcurvy, a decay from old age, a dropſy, or cachexy? And if theſe cannot be removed before amputation, it is to very little purpoſe to operate on the ſound part, as it would only be killing the patient. Is there a phyſician or ſurgeon but would conclude he occaſioned the death of a dropſical perſon, were he to cut his mortified leg off above the knee? What is true in a dropſical caſe, is equally ſo with reſpect to others: To amputate, is only to give needleſs pain, and to accelerate the patient's death. It may be further aſked, Muſt we then in ſuch a ſituation intirely abandon the patient? I anſwer, No; but we ought to direct our efforts againſt the morbid cauſe, and at the ſame time, employ the moſt effectual applications externally, lopping off whatever is abſolutely mortified, without cutting to the quick, leſt the pain, and other accidents which are the conſequence of ſuch inciſions, ſhould haſten death. After this treatment, the remainder may be left to nature, aſſiſted with the moſt efficacious medicines, internal as well as external; and if the patient dies, that

we may reſt ſatisfied that the diſeaſe was beyond the reſources of art.

SECT. XIX.

WHEN a mortification in a healthy conſtitution is the conſequence of an external accident, the point is not ſo eaſily determined; I will venture, nevertheleſs, to remove the difficulty.

It muſt firſt be inquired into, if the ailment has been properly treated at the begining, and if ſufficient care has been taken with reſpect to the cauſe. If there appears any default in theſe points, we muſt firſt endeavour to repair it, before we think of amputation. If, on the contrary, the treatment has been judicious, we muſt examine if the mortification continues to ſpread, or if it be ſtopt, and its edges begin to diſcover themſelves.

If it continues to ſpread, it is improper to amputate, for ſeveral reaſons. In the firſt place, becauſe the whole habit is in a bad ſtate, and there muſt be a fever and general inflammation, which would be greatly increaſed by an operation which, of itſelf, is ſufficient to bring on the death of the healthieſt

man. In the ſecond place, amputation cannot be performed on the ſound part, in the manner as is generally imagined, as the infection is very often more deeply ſeated than it appears to be: We may judge of this by obſerving what happens very frequently in whitlows of a bad kind, where the matter quickly inſinuates itſelf along the arm, and is pent up there, inflaming ſometimes even the axillary glands; as an inflammation of the toes, in a ſhort time, brings on that of the glands in the groin: Thus the diſeaſe having taken root in the place where the operation is performed, would of courſe be increaſed by the ligatures, which are indiſpenſably neceſſary in this operation, unleſs we would ſuffer the patient to periſh by an hemorrhage. In ſuch a caſe then, amputation is not a dubious remedy, but it is no remedy at all *; and if the patient ſometimes does eſcape, it muſt be acknowledged that nature has effected the cure; that ſhe has got the better both of the diſeaſe and of

* Mr. Sharp, to the beſt of my recollection, was the firſt who ſolidly proved the impropriety of operating on the ſound part, while the mortification continued to gain ground. This excellent doctrine not being as yet univerſally acknowledged, it is very much to be wiſhed, that the additional authority of ſo judicious a ſurgeon as Mr. Bilguer, may contribute to give it freſh weight, in order to render it general. TISSOT.

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the bad treatment, and has thus overcome a double enemy.

It is evident, from what I have ſaid, that while the mortification gains ground, the method I have propoſed, § VII. XVI. ſhould be followed. When its progreſs is ſtopt, it muſt be conſidered whether the limb can be preſerved or not. We may entertain hopes * of its preſervation, if all the corrupted parts caſt off, and the ſound parts, and even the bones, begin to produce granulations of new fleſh. I cannot here omit remarking, that Mr. Haller's late experiments, which prove to the ſatisfaction of many eminent anatomiſts, the inſenſibility of the perioſteum, render the ſign of a mortification derived from ſuch inſenſibility very doubtful. My experiments on this ſubject agree with his, excepting in this, that I always found the pericranium extremely ſenſible †. What-

* I ſhall tranſcribe Mr. Bilguer's own words. *Quo quidem loco non poſſumus, quin obſervemus, ſignum illud corruptionis quod a deffectu ſenſûs deſumi ſolet, per illuſtris Halleri experimentis, quodam modo incertum redditum eſſe, quibus quippe evictam perioſteorum inſenſibilitatem eſſe multi clarioque viri putant. Noſtra de his rebus experimenta fere cum Halleri doctrina congruunt, niſi Pericranium numquam non ſenſibiliſſimum deprehendimus.*

† See, on this ſubject, the memoir of M. Haller, on the ſenſible and irritable parts, T. 1. 4.

ever weight may be laid on theſe experiments, this conſequence may at leaſt be deduced from them, that we ought not immediately to conclude that the bones and perioſteum are affected, becauſe we prick, cut or tear the perioſteum without giving pain; nor, in like manner, from this ſymptom, ought we to neglect the medicines indicated § VII. XVI.

If the rottenneſs of the bone demonſtrates that the limb cannot be ſaved, which almoſt always happens, if the patient has been improperly treated, we muſt amputate, if the ſtrength of the patient be ſufficient to ſupport this dreadful expedient, and amputate on the ſound parts. It is true, that amputation in this caſe is a doubtful remedy, but nevertheleſs as there is no other, and as there is no ſymptom in the patient that forbids its uſe, it is a remedy. If the patient be weak, the caſe is deſperate, as he is not able to ſupport the operation on the ſound parts, and as nature is not in a condition to effect a ſeparation of the dead from the live fleſh, if only the mortified part be cut off.

In ſo dangerous a caſe, the method I would take, would be, after providing againſt any hemorrhage of the larger veſſels by a proper ligature, to lop off all the gangrened uſeleſs maſs,

maſs, not actually through the quick itſelf, but very near it; afterwards I would endeavour to ſtop the progreſs of the infection by internal medicines and ſuitable dreſſings. I would ſupport his ſtrength by a proper regimen; if it increaſes, we may be ſure a ſeparation of the ſoft parts that are mortified will enſue naturally; after which, it will be eaſy to ſaw off the little ſtump of dead bone that was left. The wound may then be cicatriſed, by means of epulotic applications, and ſuch as we have recommended for bones when laid bare, § X.

This practice is not only conformable to ſound reaſon, but what is more, it is confirmed by repeated experience; ſince we find among the collectors of obſervations, but few inſtances of amputation ſucceeding, when it was performed while a mortification continued to gain ground, or while the patient was feveriſh; but a much greater number of ſucceſsful caſes, when amputation was performed late, and when the diſeaſe had abated naturally: A variety of examples may be ſeen in the work of Mr. Schaartchmid *, which I have already quoted.

* Sammlungen, &c. a performance which ought to be generally read.

It will, perhaps, be objected to me, that I am inconſiſtent with myſelf, ſince I have juſt propoſed one method, and actually follow another; but this objection will vaniſh, if it be conſidered in the firſt place, that if a perſon has been thus judiciouſly treated from the beginning, and does not recover, a cure will almoſt never be effected, after the cruel expedient of amputation. In the ſecond place, that all thoſe who are under a neceſſity of ſubmitting to this dangerous operation, on account of their having neglected themſelves, or having been unſkilfully treated, have no reaſon to complain of the art, or of thoſe who underſtand it, but of their own negligence, or of the ignorance of thoſe into whoſe hands they have had the misfortune to fall. And in the third place, that in oppoſing amputation on the ſound parts, and in teſtifying my abhorrence againſt the needleſs pain which accompanies it, I do not at all condemn the amputation of what is abſolutely mortified.

I have however ſufficiently expatiated on this point, which ought to be conſidered before the others, as being more general. I now proceed to examine the accidents that induce ſurgeons to amputate in order to prevent a mortification.

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There are ſome who have carried their precipitation, in this reſpect, to ſuch a length, as to cut off limbs upon the ſpot, that have been conſiderably bruiſed, before they tried any other remedy: A piece of cruelty I cannot in any ſhape approve of *.

SECT. XX.

I SHALL treat at preſent of large contuſions of the limbs, eſpecially of thoſe where the fleſhy parts, as well as the bones, are extremely bruiſed and ſhattered, as commonly happens, when the hand, the foot, the elbow, the leg, arm or thigh, have been bruiſed by a large ſtone, a beam of wood, a cart-wheel, a ſcrew, a preſs &c. In ſuch caſes, ſhall the patient get ſooner well by amputating or not amputating this ſhattered limb?

* This practice has alſo been condemned by others. See the collection of pieces which put in for the prize conferred by the royal academy of ſurgery. T. 3. p. 490. It is there obſerved, that every amputation performed immediately after the hurt, is generally dangerous in its conſequences.

I know that a ſoldier, who had his arm cut off in the field of battle, after the affair of Prague, died the third or fourth day after the operation.

I anſwer, by not amputating; the worſt conſequences that can be apprehended, is a mortification or an hemorrhage. With regard to the mortification, unleſs every thing I have hitherto ſaid concerning it be intirely groundleſs, we ought not to be afraid of it; and it is much eaſier to prevent than to cure it. With reſpect to the hemorrhage, it is no doubt to be dreaded, but this dread can be no reaſon for inſtantly taking off the limb: To be convinced of this, we need only examine thoſe wounded men who have had an arm or leg carried off by a ball, and the ſtump ſo ſhattered, that the bone has been ſhivered into ſeveral pieces, and the large blood veſſels moſt ſhockingly torn, who have, notwithſtanding, been cured without amputation, and with whom the bleeding has ſtopt, even without the aſſiſtance of a ſurgeon. Nevertheleſs, every body knows that contuſions of this kind have been hitherto, by moſt ſurgeons, accounted a ſufficient cauſe for amputation; and that when the hand or foot have been ſhattered, they have carried their inhumanity ſo far, as to take off, not only the leg or fore-arm, but even ſometimes above the knee or joint of the elbow.

Thoſe who follow this method, amputate within a few days of the accident, while the

the patient is vigorous, and without waiting for the event of any other kind of treatment; for if the patient be weak, old or very ill, even with the conſequences of the wound, they do not venture upon the operation.

It would however, in my opinion, be much better not only not to take off an arm, a thigh, or a leg, which are unhurt, but even to endeavour to ſave the foot or hand which are ſhattered, in obviating, by medicine and diet, as well as by external applications, the accidents that may enſue; and thus prevent a perſon who has already ſuffered ſo ſeverely, from meeting with a treatment ſtill more ſevere.

It will be aſked, if the thing be poſſible? The following obſervations will furniſh an anſwer. I publiſh them with ſo much the more confidence, as they are known, not only by the patients themſelves, but by a great number of the phyſicians and ſurgeons of the army. They muſt be deciſive in favour of preſerving contuſed and ſhattered limbs, in oppoſition to amputation.

SECT.

SECT. XXI.

WHEN a patient is brought to our military hoſpitals, who has had his foot, leg, hand or arm ſhattered by a ball, or any other violent cauſe, whether the parts are intirely carried off, or adhere by a little fleſh and ſkin, but in ſuch a manner that there is not any hope of a re-union; in this laſt caſe, we begin by cutting through theſe ſlender attachments which keep the part ſuſpended, and thus intirely ſeparate it from the body. In both caſes, when pieces of the extremities of the bones jut out, and may prove hurtful, they muſt be ſawed off with a convenient ſaw, whether they be moveable or ſtill firmly adhere to the limb: When they are moveable, they muſt be held by an aſſiſtant. I hope no man in this treatment, will pretend to ſee any thing like what is properly called amputation, which I condemn.

After this firſt operation, I carefully examine if there be ſtill any ſmall ſplinters left, and whether they are only held by the fleſhy parts, or ſtill adhere to the bone; I remove all thoſe, with the fingers, or with inſtruments,

ments, that can be ſeparated without violence or a freſh effuſion of blood.

After removing as many ſplinters as I can, I ſlightly compreſs the limb between my hands, gently ſtroking it lengthways, from above downwards, endeavouring, at the ſame time, to reſtore, as much as poſſible, its natural ſhape; I dreſs the ſore with a digeſtive, to which I add a little eſſence of myrrh, or ſolution of maſtic: I cover the whole with dry lint; applying the ſame bandage as after artificial amputation, ſufficiently tight, without, however, running the riſque of cauſing pain or increaſing the inflammation: Afterwards I moiſten the whole with as much ſpirit of wine as may penetrate to the parts affected; taking care to keep the limb extended in a right line, and laid ſoft.

The firſt days, till the ſuppuration becomes plentiful, I only dreſs it once every twenty-four hours, ſometimes ſeldomer; but when the ſuppuration is begun, I renew the dreſſings twice a day; and ſuch of them as immediately touch the bone, or fleſhy parts of the wound, I cover with lint dipt in ſolution of maſtic, balſam of Fioraventi, or ſome other balſamic eſſence, in order, by that means, to prevent too large a ſuppuration. I likewiſe remove, each dreſſing, all the

the little ſhivers of bone which do not reunite, and which, though they could not be ſeparated at the firſt dreſſing, may in the ſucceeding ones.

With reſpect to the larger fragments, which muſt form the ſtump of the bone, I not only take care not to looſen them, but even, as I already remarked, endeavour to promote their coalition, by light compreſſion with the hands, and binding the bandage ſomewhat tighter than I would otherwiſe do. If, at the expiration of a month, a fragment of this kind is not coaleſced, but on the contrary, is become more looſe, without however being intirely ſo; in that caſe, by ſhaking it gently, moving it upwards and downwards, and looſening the fleſhy parts that hold it, I endeavour to bring it away intirely. If there are ſome of them cracked as high as the articulation, I give myſelf no concern about them, but leave them to nature *. But as to the ſmall, ſhort, pointed ſhivers

* Felix Wurz and Gœuey cured, as may be ſeen in Heiſter's Surgery, t. 1. p. 183. the longitudinal fiſſures of the bone, by a ſuitable dreſſing, which is mentioned in the ſame place. If it ſhould happen, what I have never yet had an opportunity of ſeeing, that the bone was ſplit longitudinally as far as the joint, and that it appeared impoſſible to procure its coalition by means of proper dreſſings, I would make, taking care to

ſhivers which do not re-unite with the bone, I take care, as I have already obſerved, to remove them as ſoon as poſſible, commonly in the firſt ſeven or eight dreſſings; and at each dreſſing, I gently ſtroke down the muſcular fleſh towards the end of the ſtump; I keep the whole firm, by giving a proper degree of tightneſs to the bandage; moiſtening it, as long as the dreſſings are neceſſary, two or three times a day with ſpirit of wine. By theſe means, ſuch kind of patients, at the end of four or five months, are as compleatly cured as the nature of the accidents will admit of.

to avoid the blood veſſels, two inciſions, from the extremity of the ſtump to the joint, that ſhould go as deep as the bone, and whoſe diſtance muſt depend on the breadth of the ſplinter to be extracted. I would raiſe up from the bone the fleſh included between the two inciſions, with a ſcalpel or myrtle-leaf, avoiding to hurt the blood veſſels as much as poſſible; then, having detached the ſplinter, by means of the ſcalpel, from its adheſion with the ligaments of the joint, I would bring it away.

If the hemorrhage were conſiderable, before I extracted the bone, I would tie the veſſels of the fleſhy part which adhered to it; and after having removed the bone, I would undo the ligatures, reſtore the fleſh to its place, take care of the ſmall wounds made by the needles, and would dreſs the whole part in the manner already mentioned in this ſection.

SECT. XXII.

BESIDES what I have already ſaid, I muſt further add ſome other uſeful remarks.

If the patient, as is generally the caſe, be weakened by the diſcharge of blood, his ſtrength muſt be ſupported with broths, with herbs boiled in them, and with wine and water. Further, I order him every four hours half a dram of the bark, till the pulſe is ſufficiently raiſed, and a laudable ſuppuration comes on; he may then be allowed ſome meat, herbs, and food of different kinds of grain; water, acidulated with vinegar or ſpirit of vitriol, may ſerve for drink.

When the ſuppuration is too plentiful, and the wound appears diſpoſed to heal, I purge once or twice with Epſom ſalt, having previouſly for a few days adminiſtered ſome abſorbent powders. During the day I make him drink a ſlight decoction of the bark, before and after meals a little ſtrengthening acid elixir; and in the evening, a ſmall doſe of bark, mixed with a fourth part of

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an abſorbent powder *. The following is the compoſition of the ſtrengthening elixir; *Half an ounce of the extract of wormwood; of that of gentian, leſſer centaury, green oranges, and buckbean, of each a dram; rectified ſpirit of wine, four ounces; and ſpirituous mint water, one ounce: Let the extracts be diſſolved in the ſpirits, over a gentle fire; ſtrain them, then add to the ſtrained liquor, half an ounce of dulcified ſpirit of nitre, and thirty drops of oil of vitriol.*

SECT. XXIII.

IT ſometimes happens that theſe patients, § XXII. are ſeized with a fever, it begins with great cold, ſometimes even with a chat-

* I do not eaſily comprehend of what ſervice abſorbents can be to wounded patients; but it appears obvious to me, that they muſt impair the efficacy of the acids, which are clearly indicated with reſpect to the fever, inflammation and gangrene: The only circumſtance in which I imagine they can be of uſe, is, when the ſtomach, by taking the acids for ſeveral days, is a little diſordered, which may happen when the patient has been much reduced by the hemorrhage; then a few doſes of abſorbents would remove this ſlight inconvenience. Otherwiſe, I am convinced, by repeated experience, there is no occaſion for them, when the bark is joined with acids, as is judiciouſly done by Mr. Bilguer. TISSOT.

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tering of the teeth, which laſts half an hour, an hour, or ſometimes longer, and is ſucceeded by a gentle heat, which terminates in about three or four hours, in a moderate ſweat. The interval laſts two or three hours, at the expiration of which the fit returns; ſometimes it is accompanied with a diarrhœa.

The moſt common cauſes of theſe fevers, are either in the firſt place, a bad digeſtion when a perſon has taken too much food, or the food is greaſy, indigeſtible, and ſubject to putrefaction; or, ſecondly, a reabſorption of purulent matter, which taints and inflames the blood; or, thirdly, a bad air, ſuch as is very often that of an hoſpital, notwithſtanding all the precautions that can be taken.

It is of conſequence immediately to ſtop this fever, leſt it ſhould diſſolve and corrupt the blood, and become a putrid fever: If it is not accompanied with a diarrhœa, a vomit of ipecacuan may be given, joined with a few grains of rhubarb: If there is a looſeneſs, the ſame medicine may be repeated the following morning, and even ſometimes the third day. Through the day may be given a little of the ſtrengthening elixir deſcribed in the preceding ſection; and in the even-

evening, when the patient has had a vomit in the morning, half a dram or two ſcruples of the following anodyne powder may be adminiſtered; *Virginian ſnakeroot, zedoary, of an eleoſaccharum made with the eſſential oil of fennel, of each two ſcruples; calcined hartſhorn, ſixteen grains; cynogloſs pills, four and twenty grains.* Afterwards I gave every day ſome of the ſtrengthening elixir, a compounded powder of the bark, and a ſtrengthening decoction. The powder conſiſts of *two drams of bark, one dram of ſal ammoniac, and a dram of an eleoſaccharum, made with the eſſential oil of fennel.* The ingredients for the ſtrengthening decoction are as follow: *The herbs of fluellin, baum and yarrow, of each half an ounce; of that of mint, two drams; chamomile flowers, an ounce; thoſe of red poppy, half an ounce; orange peel, two drams; ſhavings of ſaſſafras, caſſia lignea, carvy ſeed, of each a dram; bark, four ounces; and Virginian ſnakeroot, one ounce.* Theſe ingredients muſt be properly cut ſmall, bruiſed and mixed together. By the above medicines the fever is commonly relieved *.

SECT.

* Mr. Bilguer having ſeen the good effects of this compoſition, inſerts it according to the form he made uſe of; and without doubt, it is a very efficacious medicine: But it might be rendered much more ſimple

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SECT. XXIV.

I HAVE treated hitherto of limbs intirely divided; I ſhall now examine what ought to be done, when a ball, or any piece of iron or lead, has ſo greatly injured the bones of the hand, arm, foot or leg, that, although they are not quite broke through, and the part ſuſpended by a ſmall portion of fleſh and ſkin, as in the former caſe, § XXI. are nevertheleſs ſo much ſhattered that the part may be moved any way, and ſeems to hang uſeleſs. In theſe circumſtances, we muſt dilate the aperture made by the ball, or by whatever body has inflicted the wound, and ſeparate the fleſh from the bone; in a word, we muſt make the wound ſufficiently large, in order to lay the ſhattered bones bare, eſpecially where they are broken acroſs, that they may be more eaſily managed by the fingers; then as many ſplinters as poſſible muſt be extracted, as well as the ball and other extraneous bodies. If there be the apertures of two balls, they muſt both be treated in the ſame manner: When it is

without imparing its virtues; and ſimple medicines, in my opinion, are preferable on every occaſion, but particularly ſo in hoſpitals. TISSOT.

expedient to make counter openings, they may be made indifferently, whether there be one or two openings, and theſe artificial wounds muſt be made ſufficiently large, to admit of the extracting of the ſplinters and other extraneous matters. In other reſpects, the dreſſings muſt be the ſame as § XXI. Every time they are renewed, the ſplinters muſt be extracted as they become looſe and can be eaſily ſeparated; if there be ſome large fragments which muſt be removed, we may begin by dividing them from the fleſhy parts, then ſawing them through with a very ſmall ſaw, whoſe blade is extremely thin and narrow, crooked or ſtraight, in order to puſh it from above downwards, or from below upwards, or ſideways, as may be convenient. This method anſwered ſo well with me for the bones of the leg and arm, that I have often, in this manner, ſeparated pieces three or four inches in length, and even longer. As for the ſmaller bones, ſuch as thoſe of the hands or feet, I have divided and extracted them entire, when they were broken and ſhattered, and ſometimes even when they were not.

If a bullet has penetrated into the cavity of a bone, ſuch bone muſt be laid bare, either on the ſide by which the bullet has made its way, or on the oppoſite one; afterwards

wards it muſt be pierced with two or three trepans, and the extraneous body, and the ſhivers of the bone extracted.

If the bullet has made its way into one ſide of the joint of the elbow or knee, and by that means ſhattered ſeveral bones at one ſtroke, I treat it in the ſame manner, dilating the wound and extracting the ſplinters as before, and the wounds get well like the others.

I cured a patient who had been wounded by a bullet which entered the cavity of the os humeri; he would not conſent to have it extracted, which did not however prevent his recovery, nor has he felt any further inconvenience from it than a ſmall protuberance on the place where the ball is ſtill lodged *.

It will perhaps be aſked, if it be poſſible that a ball ſhould enter the cavity of a bone without ſplitting or breaking it, as ſeems to have happened in the caſe I have juſt mentioned? and where that circumſtance will appear ſtill leſs feaſible, when I affirm, that the bones of this man were

* He was a ſoldier in the guards, and is doing his duty in the field at the very time I write this.

ſtrong,

ſtrong, hard and compact; and that on ſome occaſions, fiſſures and the other accidents of bones, I have been treating of, are often the conſequences of ſlight wounds, as of more conſiderable ones. But be that as it may, I treat theſe kinds of wounds in this manner: I dreſs the bone partly with dry lint, and partly with balſamic eſſences, and ſometimes I throw in injections: I apply a digeſtive to the fleſhy parts, and moiſten all the dreſſings with ſpirit of wine, as in § XXI. I check the ſuppuration a little, preſerving, as much as poſſible, the boney fragments which adhere together, ſo as to leave room to hope for their coalition, ſuſtaining them in their natural poſition, and covering them again as much as poſſible with the fleſh and ſkin: If there be any pointed ſplinters, I endeavovour to promote their ſeparation by proper applications, ſuch as the balſamic eſſences, and different powders, particularly that mentioned § X.

I fix the limb in its natural poſition, ſuſpending the arm in a ſling, or half-cylinder adapted for the purpoſe. For the leg, I uſe Mr. Petit's machine, or ſplints, made of wooden rods covered with ſtraw, and wrapped up in linnen cloth; and in the dreſſings, my chief aim is to keep them ſufficiently tight above and below the wound, to pro-

mote the conſolidation of the larger pieces of bone, by keeping them firm in their places, and preventing the re-abſorption of pus. The diet and medicines are the ſame as in § XXII. By this method a very great number of wounded men have been reſtored to health, in two, three or four months; and ſome not before the expiration of eight. My obſervations confirm thoſe of Horſtius, who remarks, that a man who has loſt a great portion of the tibia and fibula, may nevertheleſs, after his cure, walk with eaſe, and halt but very little *.

SECT. XXV.

SUCH kind of wounds, however, are not without danger; the patient is not only very liable to be ſeized with ſuch a fever as I have ſpoken of § XXIII. but he alſo runs a riſque from the wound itſelf. It is true, that theſe two dangers, that attending the fever, and that from the wound, which I ſhall

* HORSTII *obſervationes medicæ*, part ii. l. 4. obſ. 10. Mr. de Frengler, captain lieutenant in the regiment of Anhalt Bernbourg, is an inſtance of a moſt ſucceſsful cure of a wound of the leg of this kind. In the ſequel of this diſſertation may be ſeen, ſeveral ſtriking caſes of an extraordinary loſs of ſubſtance in the bones being again repaired.

men-

mention by and bye, are connected, and generally accompany each other. It ſometimes happens of a ſudden, and without the patient, or the phyſicians and ſurgeons having any ſuſpicion of it, that the wounds dry up, become corrupted, and exhale an infectious ſtench; the neighbouring parts are very much inflamed for ſome days, after which the inflammation goes off, leaving a kind of œdematous tumour, which produces an abſceſs, with a laudable diſcharge, or degenerates into a malignant ſore, without any abſceſs. Sometimes theſe ſores are beſet with ſwarms of maggots.

The treatment of the fever is the ſame I have deſcribed § XXIII. that of the wound, in this troubleſome ſituation, ought to be to endeavour intirely to remove the inflammation, which readily terminates in ſuppuration, and forms large cavities full of matter, which muſt be opened.

A moderate compreſſion of the neighbouring parts, in this caſe, as in thoſe I have already mentioned, contributes to prevent the reabſorption of the purulent matter. If the inflammation runs high, and the patient is young, it ſhould be moderated by bleeding, and other medicines calculated

to check and reſolve the inflammatory denſeneſs of the blood *.

If the cauſe of the inflammation be obvious, it muſt be removed; thus every pointed ſplinter of a bone muſt be ſeparated with a knife or ſaw; whatever occaſions a compreſſion muſt be taken away, and if there be any fibrous part cauſing too great a ſtricture, it muſt be cut through, dilating the wound by inciſions of a convenient depth.

The dryneſs and putrefaction of the wound, may be remedied by dreſſing it with the powder compoſed of ſal ammoniac and camphor, mentioned § X. and by moiſtening it afterwards with oil of turpentine; or, I cauſe the wounds, both the original ones,

* At preſent, ſince we know that pus is only a corruption of the craſſamentum of the blood, it is eaſier, perhaps, than formerly, to explain why an inflammatory denſeneſs of the blood terminates ſometimes in an abſceſs, and at other times in a compleat recovery without one. Dr. Pringle, to whom we are indebted for ſo many uſeful diſcoveries, which have thrown a new light on the theory and practice of phyſic, was the firſt who pointed out the true manner in which pus was formed, concerning which ſo many conjectures had been made; and Mr. Gaber has demonſtrated it very particularly by a number of very curious experiments. Tiſſot.

and

and thoſe made by the ſurgeon, to be dreſſed with pledgets, dipt in a balſam compoſed of *four ounces ſpirit of wine, half an ounce ſpirit of turpentine, and three drams ſpirit of ſal ammoniac:* Afterwards, having firſt applied the dreſſings very thin, the parts muſt be conſtantly fomented with ſome of the compoſitions mentioned § XXI.

The maggots may be deſtroyed, by frequently ſhifting the bandages, linnen, cloaths, and coverings of the bed; by the application of the balſams I have already ſpoken of, which deſtroy theſe inſects and prevent putrefaction; by conſtantly keeping on the bed-clothes, a linnen cloth dipt in tincture of aloes or vitriol. But care muſt be taken that the tincture of aloes does not touch the affected limb, much leſs the ſores themſelves, leſt part of it ſhould be abſorbed, and occaſion a diarrhæa; although in other reſpects aloes powerfully reſiſts putrefaction, and is ſometimes a uſeful vulnerary.

SECT. XXVI.

I HAVE had under my care, during the courſe of this late bloody war, a great number of wounded limbs, torn and ſhattered by cannon and muſket balls, by the burſt-

burſting of bomb-ſhells and grenades, by grape-ſhot, &c. I cured them without ever performing amputation, by the method deſcribed in the two preceding ſections, although there were bones broken and ſhattered, large blood veſſels divided, the fleſh miſerably lacerated, and limbs carried off in the manner I have deſcribed § XXI. Others, ſuch as I have deſcribed § XXIV. in which the bones were ſplit up as high as the articulation; all which circumſtances might make us reaſonably apprehend a tedious and difficult cure, too plentiful a ſuppuration, hemorrhages, violent inflammation, exceſſive corruption, mortification and death.

It will perhaps be aſked me, Of thoſe men ſo terribly wounded, whom you attempted to cure without the means of amputation, did none die? I ſhall return an anſwer by and bye. It will be further objected to me, that I have not taken notice of the os humeri, or the thigh bone being ſhattered; and it will be aſked me, What muſt be done in caſes where either of theſe bones are fiſſured as far as their upper extremities, in ſuch a manner that we cannot hope to procure their coalition by means of any bandage? And finally, it will be remarked, I have not mentioned the wounding the brachial

chial or crural arteries, or the large branches of theſe which paſs between the radius and ulna, or tibia and fibula, called in both parts the inter-oſſeous arteries, whether theſe wounds be accompanied with a fracture of the bones, or otherwiſe. I ſhall reply to theſe two laſt objections, after having anſwered the firſt queſtion in the following ſection.

SECT. XXVII.

I HAD at one time, during the war, in a military hoſpital, ſix thouſand ſix hundred and eighteen wounded patients, who were all treated according to my direction, and part of whom I attended myſelf; of theſe, five thouſand five hundred and fifty-ſeven were perfectly cured, and in a condition to ſupport all the fatigues of the ſervice; a hundred and ninety-five were able to do duty in garriſon, what they call half-invalides *, or to work at any trade; two hundred and thirteen remained incapable of any labour, civil or military, what they call grand invalides †; and ſix hundred and fifty-three died.

* *Halbe Invaliden.*

† *Ganze Invaliden.*

Theſe

Theſe hundred and ninety-five half-invalides, and the two hundred and thirteen grand invalides, in all, four hundred and eight, were of the number of thoſe who had their bones bruiſed, broken and ſhattered; of thoſe, in a word, whoſe wounds were called complicated and dangerous *: For it is well known that with us, a man is not put on the liſt of invalides for a wound of the head, or of the fleſhy parts; if, after wounds of this kind are healed up, there remains any weakneſs, ſtiffneſs, or tenſion of the part, we employ various medicines, both internal and external, ointments, liniments, fomentations, warm baths, by means of which they are commonly compleatly cured.

Let us at preſent ſuppoſe, that of the ſix hundred and fifty-three who died, no more than two hundred and forty-five died from the conſequences either of a violent concuſſion, from wounds of the head, thorax, lower belly or ſpine; from a complicated fracture of the os femoris, or from putrid fevers, fluxes and other inward diſeaſes, which often happen in military hoſpitals, even in caſes of ſlight wounds, from the bad air which is breathed there; there will re-

* *Schwerfracturirte.*

main

main four hundred and eight, who may have died from the conſequences of wounds with ſhattered bones; and this number is equal to that of thoſe who were cured without amputation, although their wounds had been of the ſame kind *. If, after making theſe calculations, we compare them with the prodigious number of wounded men, who, at the beginning of the war, had their limbs taken off on account of dangerous wounds, of whom ſcarce one or two eſcaped with their lives; we may very ſafely conclude, that much the greater part of thoſe four hundred and eight men cured and ſent to the invalides, would have died if amputation had been performed on them, and this ſhocking artificial wound added to what they had already received. It would be trifling to pretend that amputation would have ſaved a great many of thoſe who died, had it been timeouſly and properly performed †. Fur-

* It is obvious that Mr. Bilguer has not made his calculations in ſo favourable a manner for himſelf, as he might have done; I am perſuaded that in 6618 wounded men, a much greater number than 245 muſt have died from the conſequences of concuſſion, large fleſh wounds, fevers, fluxes, and other diſeaſes, owing to a bad habit, bad air, the ſeaſon of the year, &c. TISSOT.

† Such a pretence would in effect be abſurd: The reaſoning would amount to this; it is demonſtrated that the

Further, if it be conſidered, that many of thoſe who died, might have recovered, had they been taken care of any where elſe than in an hoſpital, where the air is very bad; and if it be called to mind at the ſame time, what ſome very eminent ſurgeons have obſerved, that two thirds of thoſe die who have their limbs cut off *, I hope it will be readily acknowledged, that my method of treating wounded limbs, by ſaving them, is highly preferable to that of amputation.

the danger ariſing from amputation, joined to that attending wounds of themſelves curable, has killed a great many patients; therefore the danger ariſing from this operation, joined to that attending wounds which have proved incurable, would have ſaved a great many patients: Only the moſt blinded obſtinacy could reaſon in ſuch a manner. TISSOT.

* See the memoirs of the Academy of Surgery, t. 2. p. 256. where Mr. Boucher, in ſpeaking of gunſhot wounds, with the bone ſhattered near the articulation, ſhews that amputation commonly proves fatal, and that of three patients on whom it is performed, generally two die; whereas out of an hundred and ſixty-five who had had the bones ſhattered, on whom amputation had not been performed, not one died. A degree of ſucceſs which he aſcribes, it muſt be owned, to the management of the ſurgeon; who, inſtead of ſpirituous applications, only made uſe of emollients, light digeſtives and anodynes.

SECT.

SECT. XXVIII.

FINALLY, I muſt add, that the greater number of thoſe who died in our hoſpitals, in conſequence of wounded limbs, were of thoſe who had the os femoris ſhattered near its upper articulation; and as we are not at preſent acquainted with any means of relieving that accident; and as it has not as yet been attempted to amputate at that part, if we deduct theſe caſes from the number mentioned in the preceding ſection who died, we ſhall ſee that the number of thoſe whoſe lives were ſaved without amputation, conſiderably exceeds that of thoſe who died. Since wounds near the ſuperior part of the thigh bone, or ſhoulder, where the bones are ſhattered, ought always to be looked on as deſperate.

SECT. XXIX.

WITH reſpect to the os femoris, I do not know that any perſon hitherto has attempted to amputate it at its upper extremity with ſucceſs: The arm has been ſucceſsfully taken off at the ſhoulder, though but very rarely.

rarely *. Every body knows that the moſt able ſurgeons only allow of the amputation of the thigh at its lower part, a little above the knee; but even ſuppoſing it could be ſafely taken off in the middle, when the bone is neither ſhattered, nor fiſſured higher

* M. Morand, the father, was the firſt who took off the arm at the joint of the ſhoulder. Mr. Le Dran performed it ſoon after in the preſence of the moſt eminent ſurgeons of Paris, Meſſieurs Petit, Marechal, La Peyronie, Arnaud, &c. which number of witneſſes, making his operation more extenſively known, that of Morand has, as it were, been forgotten, and Mr. Le Dran has paſſed for having been the inventor. Mr. Bromfield performed it ſucceſsfully within theſe few years at London; but notwithſtanding a few caſes whoſe event has been favourable, it is a very dangerous operation, and has ſometimes miſcarried. Dr. Home, an eminent phyſician at Edinburgh, equally a promoter of agriculture, medicine, and the arts, relates, that in the former war, he ſaw Mr. Mitchel perform the operation on two ſoldiers, where the os humeri was fractured as high as the joint, and who both died a few days after: It is true, he remarks that they were both in a bad way when the amputation was performed; but he adds, that this operation appears extremely dangerous, even when performed with every favourable circumſtance. *Medical facts and experiments*, p. 114. With reſpect to the thigh, there is little room to hope that the ſtruggle that is made to determine, when and how it ſhould be taken off at the articulation, can be attended with the ſucceſs which ſome people ſeem to expect from it. If ſuch an operation ſhould take place, it will perhaps very ſoon be aſked, whether it ought not to be publicly condemned? TISSOT.

up,

up, the operation will prove uſeleſs when it is done, as has ſo often been the caſe with our wounded men.

The difficulty attending the amputation of the upper parts of the thigh, is ſo conſiderable, that ſurgeons rather chuſe to abandon to their fate thoſe wounded men where it appears neceſſary, than to undertake it; and I own I am of the ſame opinion with them. If, nevertheleſs, a caſe occured, wherein the death of the patient appeared certain if amputation was not performed, and if the operation could afford any hope, I would even prefer taking the limb off at the articulation, rather than at any other place; for although it be extremely difficult, it prevents, at leaſt, the inconveniences and accidents which a ſtump might occaſion *.

But

* I am of opinion, that if one had the misfortune of being reduced to the neceſſity of chuſing between amputating at the upper part of the thigh, or at the articulation itſelf, one reaſon for prefering the latter, would be the greater eaſe there is in ſtopping the hemorrhage of the crural artery.

A ſurgeon and anatomiſt, who has been in repute, obſerves, *That an hemorrhage of the crural artery is what is chiefly to be dreaded, but the operation requires too ſhort a time, for ſuch an hemorrhage to be fatal.* It is ſurprizing to ſee him mention this operation as one that is very

 fami-

But as there can be no neceſſity for this operation, but in conſequence of the large arteries being wounded, by following the method I ſhall point out § XXXV. it will be rendered unneceſſary, and diſputes concerning it may be laid aſide: For it is very certain, that the moſt dangerous accidents even of this part, may be remedied, like thoſe in other parts, by joining to the method of treatment I have already mentioned, the operation I ſhall deſcribe § XXXV. providing it be performed in time, before the patient be exhauſted, and almoſt dying, from the effects of the hurt being too long left to itſelf. But the apprehenſion which patients have of the pain which deep inciſions into the fleſhy parts would occaſion, prevents extracting the pieces of bone which compreſs or irritate the parts around; as alſo from cutting through the membranes that are overſtretched, and cauſe a conſtriction; from giving a vent to impacted matter, and from conveying the medicines to the parts where they ought to be applied. The conſequence of all this is, that the proper re-

familiar; I make this remark, becauſe, as he is not the only perſon who may allow himſelf to talk in this manner, a bold pretender to the art, on reading ſuch a paſſage, might undertake an operation as eaſy and common, which has never yet been performed. TISSOT.

medies are applied too late, and the patient ſinks under the preſſure of the accident.

But if nature were even able to get the better of theſe difficulties, there are others to which our * wounded men are ſubject, lodged together in too great number in military hoſpitals, where the ſtate of wounds is rendered worſe by a concurrence of ſeveral cauſes, and the cure of thoſe of the moſt ſimple kind is retarded. The principal of theſe cauſes are want of cleanlineſs, an improper regimen, inconvenient beds, a continual noiſe, which hinders ſleep, bad air, frequent removals from one place to another, and conducted in an inconvenient manner; theſe circumſtances greatly contribute to make the inſtances of people recovering who are ſeverely wounded near the upper part of the thigh, where the bone is ſhattered, ſo uncommon. But if any ſhould pretend to ſay that there are none cured by the method deſcribed § XXXV. I ſhall only, in anſwer, produce the invalide ſoldiers themſelves, who are at preſent, ſome in the country, others in the hoſpitals, whoſe recovery demonſtrates the contrary. I acknowledge that this me-

* What Mr. Bilguer ſays with reſpect to the wounded Pruſſians, is but too applicable to thoſe of every army.

thod is difficult and tedious, and that more die than recover; theſe, however, are not ſufficient reaſons for declaiming againſt, or intirely condemning it, as it is the only expedient left, amputation at the ſhoulder, or upper part of the thigh, being an operation not only difficult, but highly precarious.

SECT. XXX.

I OUGHT now to ſay ſomething concerning a contuſion, or echymoſis; I ſhall confine my remarks particularly to that kind where there is a great quantity of extravaſated fluid diffuſed under the ſkin, ſuch as we often ſee, when a ball, without breaking the ſkin, injures it to ſuch a degree, that it looks like a mortified eſchar, and at the ſame time diſlocates, fractures, or ſhatters the bones belonging to the part. When a ſurgeon meets with a contuſion of this kind, the treatment is not greatly different from that recommended in a mortification; for the ſkin muſt be treated exactly like a mortified ſlough, muſt be laid open by ſeveral deep inciſions, dreſſed with the powder mentioned § X. covered with a digeſtive ointment mixed with a little eſſence of myrrh, and the part affected, as well as all around it, kept conſtantly bathed with emollient fomentations,

mentations, without any ingredient, either ſtimulating or aſtringent. With regard to the ſhattered bones, the ſame method may be followed as in § XX. If any of them are luxated, they muſt be reduced, without, however, confining them by the bandages uſed in ordinary luxations, and which, in this caſe, would make the neceſſary inciſions uneaſy, would prevent the gangrenous ſloughs from caſting off, and hinder the formation of pus: It is therefore ſufficient, after having replaced the bone, to let it remain quite undiſturbed; and when the corrupted ſlough is come off, the ſore may be dreſſed like wounds of the fleſhy parts.

SECT. XXXI.

SOME imagine that theſe violent contuſions, accompanied with fractures, require amputation, as the propereſt method of cure *. I ſhall mention, what ſeems to me ſtrongly againſt this opinion. In the firſt place we muſt reflect, that the danger of dying, in theſe caſes, does not ariſe ſolely from the fluids extravaſated in the contuſed part, but from the violent concuſſion, which

* Can it be called curing a limb to take it off altogether?

gives a ſhock, and occaſions a general compreſſion of the veſſels over all the body, eſpecially the internal ones *; and from the veſſels

* It has been known long ſince, that this concuſſion, or what may be called a general contuſion, is one of the principal cauſes of the danger ariſing from gunſhot wounds, and more or leſs from thoſe of all kinds of fire-arms; but at preſent I do not recollect to have ſeen the mechaniſm of this effect ſo well explained as in this performance. The rapidity with which the air ſtrikes, compenſates what it wants in denſity: Thoſe who love to reduce every thing to calculation, will be able exactly to determine this effect by the rule of proportion: Suppoſing on one hand, a ſtream of air, which has acquired, by the motion of the ball, a given velocity, and which acts upon a man with this degree of velocity; ſuppoſing on the other hand, a man falling upon a floor, likewiſe with a given degree of velocity, the effect will be equal, if the velocity of air, is to the man who falls, as the denſity of the board is to that of the air; or, more briefly, if the contuſing bodies be in an inverſe ratio of their denſities. I am even induced to believe, that when the velocity is augmented to a certain degree, its effect is augmented in a greater proportion than its increaſe; or, to ſpeak algebraically, that its effects ought to be expreſſed by ſome quality of its degrees; thus the effect of a velocity of 150 degrees, would be to the effect of a velocity of 125, not as 150 : 125 or as 6 : 5 but as the ſquare, or perhaps ſome other quality of 150, to the ſquare or the correſpondent quality of 125.

There are phyſical reaſons that induce us to believe that the caſe is ſo, and there are ſeveral obſervations which ſeem to confirm it. Thoſe who have ſerved in time of war, have all been witneſſes of ſome ſingular in-

veſſels being compreſſed, obſtructed or ruptured, proceed extravaſation, inflammation and ſuppuration.

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inſtance or other of the effects of the percuſſion of the air; there are inſtances of people killed on the field, without being touched by the ball. I was told by officers, men of veracity, that at the battle of Fontanoy, a ball broke the thigh bone of a ſoldier in the Dutch army, without touching him; another ſaw a man who was rendered paralytic on one ſide, by a ball whizing paſt him. Curious obſervers know, that nothing ſo greatly fatigues an army as a high wind, even the centinels are tired, without marching; the reaſon is, that a high wind occaſions a kind of general contuſion, which of courſe produces wearineſs. I do not know but ſome of the effects of lightening may be imputed to the ſame cauſe. I ſhall add nothing to what Mr. Bilguer ſays concerning the effects of a contuſion; he is ſufficiently explicit on this head; and as I have already treated the ſubject pretty largely in my book termed *Advice to the People*, I ſhall only obſerve, that in the wounds made by muſket-ball, the effect of the general concuſſion is not very conſiderable, but the danger, in ſuch caſes, proceeds from the topical contuſion accompanying the wound, the ſmall quantity of blood commonly diſcharged from it; and laſtly, as Mr. Le Dran remarks, becauſe the inſtant a man receives a gunſhot wound, he is ſtruck with a ſudden dread he cannot poſſibly reſiſt. There ſeems to me to be three reaſons for this dread, of which even the wounded perſon himſelf is not altogether conſcious; in the firſt place, the idea that gunſhot wounds are dangerous; ſecondly, becauſe the degree of the hurt is not known; thirdly, the inſtantaneous effect of the concuſſion, which renders a man much more ſuſceptible of

This commotion of the whole body, depends on the external air, which being compreſſed, condenſed, and rapidly puſhed on by a ball, moving with vaſt velocity, acts on the body with greater force, and cauſes a more violent contuſion, than any other ſubſtance, even the heavieſt has ever done. From thence proceed contuſions of the viſcera, ſpitting and vomiting of blood, oppreſſion, cough, pains, inflammations and ſuppurations internally, a fever, and other complaints which happen after contuſions, ſeemingly ſlight, and confined to ſome particular part, but which are, in fact, the conſequen-

fear. There is a point of time when courage is uſeleſs. I ſhall beg leave, in this place, to inſert a caſe I had from the eye witneſſes, and which demonſtrates the bad effect of apprehenſion on wounded patients. Two officers, in the ſervice of France, were wounded in the laſt campaign but one; one of them very dangerouſly, the other, who had been a priſoner a little time before, and had been extremely ill uſed, but very ſlightly; they were carried to the ſame place, and lodged in the ſame apartment; the firſt expected to die, but nevertheleſs recovered in a ſhort time; the ſecond hoped to be cured very quickly, and his wound, a ſuperficial one in the leg, did not diſcover the leaſt ſign of danger. The place they were in was ſurprized, and they were informed they were made priſoners; the idea of what he had ſuffered, made ſo ſtrong an impreſſion on the latter, that he inſtantly found himſelf indiſpoſed; the following dreſſing the wound appeared mortified, every remedy proved uſeleſs, and he died in a few days. TISSOT.

ces

ces of this general, and what may be called inviſible, contuſion of the whole body *.

The amputation of the limb does not remedy thoſe accidents; on the contrary, it increaſes them, by means of the dread the patient feels at the thoughts of amputation, and by the excruciating pain which attends it; thus accelerating that death it was meant to prevent. I therefore boldly affirm, that amputation cannot be of ſervice in thoſe caſes, wherein the nature of the parts and the ſtate they are in, forbid it; that in many, it is hurtful, and haſtens death; and that in others, even where the patient recovers, it is likewiſe improper, if he could be cured and the limb preſerved; a ſurgeon

* The troubleſome ſymptoms which I have here enumerated, happen ſeldomer when the limb is entirely carried off by the ball, although the concuſſion cauſed by the compreſſion of the air muſt be greater in this caſe, than when the ball has only grazed; a circumſtance which might induce one to call in queſtion the juſtneſs of my remarks in this ſection. But theſe doubts will vaniſh, when we reflect, that in a contuſion there is no diſcharge of blood, whereas it is very conſiderable in caſes where the limb is intirely carried off; and thus, the remedy is here a conſequence of the accident itſelf, ſince this hemorrhage effects what we would wiſh to effect by artificial bleeding; in contuſions, where there is no diſcharge of blood, it removes obſtructions, and diſperſes the extravaſated humours, which are the conſequences of concuſſion.

is unpardonable who employs it in ſuch a caſe.

SECT. XXXII.

AS I object to the amputation of contuſed limbs, it is reaſonable I ſhould point out the method of treating ſuch contuſions: I prevent the troubleſome ſymptoms they produce, or diſperſe them if they have already appeared, by frequent bleedings, and by the exhibition of ſuch medicines as attenuate the blood, reſolve what is too groſs, remove what is obſtructed, and render fit to be reabſorbed what is extravaſated. I join with them ſuch as, by gently evacuating by ſtool, unload the veſſels; and I afterwards give ſuch things as brace up the fibres, and reſtore the natural craſis of the blood.

I have found no medicine more effectual to attenuate the blood, and reſiſt the febrile diſpoſition, than a powder, conſiſting of nitre, Epſom ſalt, cream of tartar, and true Armenian bole *.

* I have not experienced a better medicine in ſuch caſes, than the plentiful uſe of oxymel. TISSOT.

SECT.

SECT. XXXIII.

THE external applications for a contuſed limb ſhould vary, according to circumſtances, or according as the contuſion has cauſed a mortified ſlough, or has not. If it has not, but nevertheleſs the bone is fractured, the applications ſhould be of a very mild nature. In ſuch a caſe I make no inciſions, but I endeavour to bring the two ends of the bone together, to place them in their natural poſition, and to keep them in it, by means of compreſſes and bandages, as in the common ſimple fractures: I conſtantly ſtupe the whole dreſſings with diſcutient and vulnerary fomentations *, and exactly follow the plan laid down § XIV. by which means I have almoſt always happily cured contuſions of this kind.

If the contuſion has cauſed a mortified ſlough, and has at the ſame time ſhattered the bone, we muſt begin by ſeparating the dead ſlough from the ſound parts, with a ſcalpel; we muſt make deep inciſions, and

* An infuſion of water-germander, and yarrow in water, with the addition of about a ſixth or eighth of vinegar, is one of the moſt proper fomentations in ſuch caſes. TISSOT,

neglect

neglect no means proper for promoting the diſcuſſion or ſuppuration; and the fracture of the bone muſt be treated agreeably to the method recommended § XXIV. This caſe requires great vigilance in the care of it, and we find ourſelves amply recompenſed for our labour, by the pleaſure of accompliſhing the cure of theſe unfortunate patients, either compleat, or at leaſt as much ſo, as can poſſibly be obtained in their ſituation.

There is at preſent at the hoſpital at Torgau, a ſoldier who had been grievouſly wounded; the ſhoulder and arm were very bad, from the extravaſation the contuſion had occaſioned; the ſcapula and clavicle were entirely ſhattered; the head of the os humeri diſlodged from the glenoid cavity, and puſhed downwards; the ligaments having been too violently ſtretched, now hung looſe; and the neighbouring parts, deeply bruiſed, were covered with a black ſlough, like a mortification. The contuſion and double fracture of the ſhoulder blade and clavicle are compleatly cured, the head of the os humeri never could be kept in its articulation, on account of the relaxation of the ligaments; the other ſymptoms are happily removed, but he has a cough, and almoſt conſtant fever, with its concomitant ſymptoms;

toms; whence we may conclude that matter is formed in ſome bowel, probably in the lungs, a conſequence reſulting from the contuſion of the internal parts.

SECT. XXXIV.

EVERY one will eaſily conceive, that this method of curing limbs that are wounded, fractured and ſhattered by gun-ſhot, ſuch as I have been hitherto deſcribing, is accompanied with a great deal of pain, and with murmurs and impatience on the part of the ſick; that it requires a very judicious ſurgeon, and gives him abundance of trouble, care and anxiety; beſides, I do not pretend that every patient was ſaved by it: The following lines are applicable on the occaſion:

Non eſt in medico ſemper relevetur ut æger,
Interdum docta plus valet arte malum.

But as they are oftener applicable with reſpect to amputation, the expediency of the method I have recommended, ſtands nevertheleſs on a ſolid foundation. To alleviate the pains and ſooth the murmurs of the ſick, we muſt flatter them with hope; as for the wounds made by the inciſions, they are commonly neceſſary at a time when they do not think

think of complaining or oppoſing them, and they are much leſs ſevere than the horrible gaſh made by amputation. The objections ariſing from the difficulty attending this method are happily removed in our hoſpitals, by the care and humane vigilance which Frederick the Great has exerted to provide his victorious armies with ſurgeons capable of putting it in practice.

SECT. XXXV.

I SHALL here add that with regard to thoſe who have had the thigh or arm carried off by a cannon ball, I do not recollect that any of the firſt have been brought to our hoſpital; they doubtleſs died inſtantly in the field of battle, in conſequence of the hemorrhage. Several of thoſe who had the arm carried off were brought, but the camp ſurgeons had previouſly ſtopt the bleeding, and applied the dreſſings commonly uſed after amputation, and we cured them afterwards by the method mentioned in § XXXI. The men wounded in this manner afford me an opportunity of inſerting in this place, what I had to ſay with reſpect to the neceſſity of amputation in conſequence of an hemorrhage; but I ſhall be very brief, as in theſe times, when ſurgery makes ſuch progreſs, there is no artiſt

artiſt but knows, and is familiarly acquainted with the different methods of ſtopping a bleeding. Therefore, although the interoſſeous, the brachial and crural arteries, near the articulations of the elbow or knee, or any other branches of arteries when divided, may give the ſurgeon a good deal of trouble, he is not obliged on that account to take off the limb; for in whatever ſituation we ſuppoſe the artery to be injured, the ſurgeon may always, by proper dilations, come at the wound, and ſtop the bleeding by the application of aſtringents, among which agaric and ſpirit of turpentine has, with us, very often ſucceeded, or by compreſſion or ligatures, or laſtly by all theſe means united; thus amputation ought never to be performed on account of an hemorrhage. It is even aſtoniſhing to conceive how ſurgeons ſhould think of ſuch an expedient, as frequently the difficulty of ſtopping the bleeding after amputation is greater than on any other occaſion, eſpecially if it be performed below the knee *. I therefore perſiſt in my opinion, whether the wound of the arteries be only accompanied with one in the ſoft parts, or whether at the ſame time the bone be fractured or ſhattered: In this laſt caſe, I ſhould join the treatment mentioned in this ſection to that of § XXIV.

* Memoirs of the Academy of Sciences at Paris, for the year 1732.

It will here perhaps be objected, that all theſe means would be to no purpoſe, if the brachial or crural arteries are wounded at a certain height, becauſe, in ſuch a caſe, the limb muſt waſte away for want of nouriſhment. I ſhall return an anſwer in a few words, with reſpect to the crural artery at the upper part of the thigh, which is, that whether my method can, or cannot be adopted in this caſe, there is no alternative; no ſurgeon as far as I know having ventured to perform amputation at this part, becauſe every body would dread the patient's expiring during the operation *: Neither would the wounds of the brachial artery induce me to take off the arm at its upper part, although it be practicable, becauſe I think every expedient is to be tried before we have recourſe to this; and as from ſeveral caſes we learn,

* I have not yet read the Diſſertation on this ſubject, which obtained the prize from the royal Academy of Surgery; but by perſons arrived from Paris, I have been informed, that the author carried a dog with him to the Academy, whoſe thigh he had cut off at the articulation.

Note by Tiſſot. There muſt be a miſtake in this place, ſince the writers of theſe pieces for the prize never make themſelves known. Not that I make any doubt of the poſſibility of taking off the thigh of a dog, but I don't apprehend that ſuch a fact can be at all concluſive with reſpect to the ſame operation on the human ſpecies.

that

that after the operation for the aneuriſm the member has recovered its heat, motion, and ſtrength *, even when the trunk of the brachial artery has been cut through; I think when it is wounded, we ought to tie it without fear, and afterwards provide for the preſervation of the limb, by aperient ſpirituous fomentations and by gentle frictions, which contribute to open and enlarge the ſmall veſſels, and by that means to reſtore heat and life to the parts †. If we obſerve, the firſt or ſecond

* See Heiſter's Surgery, t. i. part i. ch. 13. Edinburgh Medical Eſſays, vol. ii. art. 15. vol. v. art. 17. The Promptuar. Hamburg. and the Collections of Breſlau, in ſeveral places.

† Anatomy, obſervations in ſurgery, and the opening of dead bodies, concur to eſtabliſh Mr. Bilguer's opinion.

The anatomical proofs are drawn from the inſpection of the arteries. I am perſuaded, that unleſs the crural artery is wounded almoſt at its egreſs from the arch formed by the tendons of the abdominal muſcles, where it loſes the name of iliac, its being deſtroyed will very ſeldom occaſion the loſs of the limb; beſides three ſmall branches which it ſends off almoſt at its egreſs, and on which, I own, I ſhould have no great reliance, for the nouriſhment of ſo large a limb, both on account of their ſmallneſs and their diſtribution, at about two or three inches diſtance from the artery, it ſends off other branches much more conſiderable, among others, two called the muſcular arteries, eſpecially the external one, deſcends pretty large down the thigh, and

ſecond day after the operation, a little ſwelling or heat below the wound, we may conceive great hopes that the whole limb will revive: If, on the contrary, whatever is below the wound ſhrivels, grows cold and dry, then we may think of amputation, without, however, being precipitate; as a mortification in this caſe is always ſlow, and ſometimes the limb recovers heat and motion very late. But I am convinced this caſe will very rarely

very evidently contributes to the nouriſhment of the muſcular parts; although their trunks have not been traced ſo far as the leg, I make no doubt but it may be diſcovered that their branches reach that part, and which, though ſcarcely viſible in their natural ſtate, would not fail to become larger, when the blood was thrown into them in greater abundance; beſides, the anaſtomoſis of any conſiderable branch with the trunk of the crural artery, conveys ſo much blood to it, that it may again become uſeful: Experience demonſtrates that this happens in the arm, and it is highly probable that the ſame thing may take place in the thigh; the number of branches which ſpring from the brachial artery, almoſt from its beginning, and their diſtribution being very analogous to what we ſee in the crural artery.

The ſurgical obſervations which demonſtrate the recovery of heat in the parts after the operation for the aneuriſm, although the brachial artery has been tied very high, are common, and may be found among other obſervators beſides thoſe quoted by Mr. Bilguer, and there are doubtleſs few phyſicians or ſurgeons who have not had opportunities of ſeeing ſuch caſes themſelves.

It

rarely require amputation. In conformity to the plan I have propoſed, I ſhould now mention the two laſt circumſtances wherein amputation is deemed neceſſary, a caries of the bone, and a cancerous diſpoſition of the part; but I imagine it will be better firſt to relate ſome inſtances of cures effected without amputation, wherein this operation to many ſurgeons would have appeared indiſpenſable.

The firſt caſe I ſhall relate is very remarkable, of a ſoldier in his royal highneſs

It is a ſight extremely intereſting, to obſerve the gradual return of heat, ſtrength and colour, to an arm on which the operation for the aneuriſm has been performed. I do not know that this operation was ever performed in the thigh, the artery being ſo guarded in this part, that an aneuriſm rarely forms here. I have ſeen the operation ſucceed very well in the inferior part of the leg, on the tibialis anterior, and the foot ſuffered but very little for a few days; it is true it is ſupplied with ſeveral other branches.

Some curious diſſections of dead bodies afford a third argument, as the crural artery has been found quite obliterated in the upper part of the thigh, in conſequence of a morbid cauſe, without the leg having been deprived of its nouriſhment, though ſupplied perhaps more imperfectly.

Warm water baths, in theſe caſes where the circulation is to be promoted through the ſmaller veſſels, and their diameters enlarged, are among the moſt efficacious remedies. TISSOT.

prince Henry's regiment, whom my friend M. Kretchmer, an able artiſt, and principal ſurgeon of the hoſpital, and Mr. Sterneman one of the ordinary ſurgeons, had the care of under my direction, and cured compleatly to the ſurprize of every body. The left arm was terribly ſhattered by four different pieces of iron ſhot, the os humeri was broke through the middle, and the arm pierced with eight holes, and at the joint of the elbow there was a true aneuriſm, of the bigneſs of a large fiſt. Mr. Kretchmer began by applying the tourniquet at the armpit in order to ſtop the bleeding; then of the eight wounds or apertures, he choſe two neareſt to the fracture, and dilated them in ſuch a manner as to lay the bone bare; he likewiſe dilated a little the ſix others; after theſe dilatations he extracted ſeveral large ſplinters, he then brought the two ends of the bone together, placed them in their proper poſition, in which he made them be kept by aſſiſtants, while he moiſtened all the wounds with equal parts of ſpirit of wine and arquebuſade water, and covered them with lint; he wrapped up the whole arm in linnen cloth, and faſtened the bandage moderately tight: he next applied gradual compreſſes to the aneuriſm, and bound it up with a roller by itſelf; after which he moiſtened the whole with the ſame mixture of ſpirit of wine and arquebuſade water, and as much

martial ball as he could diſſolve in it, and applied over the bandage for the aneuriſm the fomentation which I have already mentioned, made with the ſpecies for the black decoction *. He ſlackened the tourniquet every two hours, drawing it tight again immediately; he removed it altogether at the end of a few days, contenting himſelf with compreſſing the artery under the armpit with bolſters and a bandage which did not hinder the dreſſing of the wounds. He dreſſed them every day, but the bandage for the aneuriſm he renewed only every other day, although two of the openings lay under it. In this manner he perſevered with great aſſiduity for a conſiderable time. All this while he made the hand and fore arm be ſecured in a cylinder of ſtrong paſteboard, and ſuſpended in a ſling. He bled the patient frequently, gave him vinegar and water for his drink, and made him take from time to time the powders which I mentioned before, conſiſting of nitre, Epſom ſalt, cream of tartar, and true Armenian bole †. By theſe means only, he

 reſtored

* See § XIII.

† § XXXII. It is long ſince the bolar earths have had the reputation of being uſeful in contuſions, but this I am afraid is founded on a miſtake; I have never, in any caſe, experienced the leaſt effect from them that could

reſtored this arm, which was ſo bad that it could not even be taken off, to ſuch a ſtate, that in the courſe of three months, after having removed ſome ſplinters, the aneuriſm was diſperſed, and the fracture and wounds were perfectly cured.

We cured another ſoldier belonging to the regiment of Brandenburgh Bareith, whoſe elbow was miſerably torn by five pieces of iron ſhot, ſome of which ſtuck faſt in the part, and where both bones of the fore arm were ſhattered.

After having dilated the wounds, we extracted ſome ſplinters, ſawed off a piece of the cubital bone about four inches long, and in dreſſing the wounds endeavoured to avoid too large a ſuppuration.

could induce me to think they poſſeſſed the virtues aſcribed to them. True bole armenic might prove ſomewhat aſtringent in the firſt paſſages, but could not do any ſervice in this way; or might ſuffer perhaps a ſmall portion of the vitriolic acid it contains, to diſengage itſelf; but four or five drops of the ſpirit of ſulphur, would be more uſeful in this reſpect than a doſe of the bole: Thus I am almoſt convinced it is of very little benefit in this compoſition, and if of any, it muſt be by blunting the action of the neutral ſalts, and preventing the uneaſineſs they ſometimes occaſion to perſons of delicate ſtomachs. TISSOT.

In the ordinary method amputation would certainly have been performed, as the fore-arm was ſhattered, and the upper arm which was untouched could admit of the operation, but we ſaved the arm and made a perfect cure without having recourſe to ſuch an expedient, which are ſo many evidences that give their teſtimony in favour of our method, which we can produce to the partiſans of amputation.

M. de Saſs, colonel commandant of a regiment belonging to the garriſon of Lattorf, and who is at preſent commandant at Brieg, received at the battle fought near Czeſlau, a muſket ſhot in the leg, which ſhivered the two bones into ſeveral fragments, of which ſome of four or five inches in length were extracted. The ſurgeons thought amputation neceſſary, and preſſed him to ſubmit to it; he refuſed however and recovered; although the limb is bent outwards he can walk and go about his buſineſs with eaſe.

A ſoldier of the regiment of Cuiraſſiers of Geſsler, called Lukraſka, was wounded in the going through the exerciſe with the regiment, in ſuch a manner that the two bones were fractured in the middle, with ſeveral fiſſures lengthways. After having laid the fiſſures of the bone bare, I ſawed through a piece of the tibia about five inches in length,

which I removed together with the marrow; I ſeparated with a pair of forceps the uſeleſs parts of the fibula which jutted out, then I placed the bones in their natural poſition, and at the expiration of four months the patient was cured. This limb was ſomewhat ſhorter than the other, he could nevertheleſs walk and leap with eaſe.

M. de Franckenberg, a captain in Hulſen's regiment of foot, was terribly wounded by a muſket ball at the battle of Loboſchitz; all the bones of the tarſus were broke and ſhattered in ſuch a manner that it ſeemed almoſt neceſſary to take away the whole number; which being done, and the parts of the foot brought cloſe together, it recovered ſo far that this gallant officer, with the help of a double heel, can walk conveniently, and is able to do duty along with his regiment in garriſon at Alt-Sydow.

M. de Alvenſleben, enſign in the guards, received at Torgau a wound above the foot which ſhattered the tibia and fibula, and the ſplinters forced by the violence of the ſhot formed three diſtinct layers; I was obliged to make a great many deep inciſions, and in a little time he was ſo much better, that I could venture to entruſt the remainder of the cure to the ſurgeon of the regiment.

A ſol-

A ſoldier of Sybourg's regiment of foot, named Mieke, ſeventy years of age, received near Mieſſen in 1759, a muſket ſhot which ſhattered the ſhoulder bone two fingers breadth below the articulation; a ſplinter was taken out five inches long; he was nevertheleſs perfectly cured at the end of nine months, and left Wittemberg to go to the hoſpital of Invalids at Berlin.

M. de Stabenwol, captain lieutenant of Grabow's regiment of foot, at the battle of Kunnerſdorf, received a muſket ſhot which ſhattered the head of the os humeri cloſe to its articulation with the ſcapula; he was perfectly cured in the ſpace of eight months, and went from Stettin to Berlin †.

M. de

† I have ſeen an officer, a captain in the French ſervice, who received a muſket ſhot, with the muzzle of the piece cloſe to the part; the ball ſhattered the humeral bone near its head, cloſe to the articulation: had the wound been ſomewhat lower, that is leſs dangerous, his arm would have been taken off; the impoſſibility, or the difficulty of the operation prevented it; he ſuffered all the inconveniencies that a wound can occaſion, for a conſiderable time ſeveral ſplinters were extracted, at length at the end of five months he was cured. This caſe appears to me of conſequence, becauſe here we ſee a very bad wound of that kind for which amputation is performed every day, and the danger aggravated by the nature of the part where it is inflicted, where they do not amputate, becauſe it cannot be done, yet it was cured.

M, de Rottkirk, commandant of the margrave Charles's regiment, and M. de Krockow, captain in Schlabrendorf's regiment of Cuiraſſiers, received each of them a wound through the joint of the ſhoulder, and were both compleatly cured at the expiration of about ten months.

M. de Britzke, commandant of Knobloch's regiment of foot, was wounded, near Dreſden, by a muſket ball which pierced the articulation at the elbow, and ſhattered the three bones which join at that place. Several ſplinters were extracted; this officer nevertheleſs in about two years was compleatly cured, and at preſent does his duty glorioufly at the head of his regiment.

I ſhall finiſh the account of theſe caſes with that of a prince wounded at the battle of Kunnerſdorf. A muſket ball wounded him very badly, paſſing through his foot at the articulation of the tarſus and metatarſus in ſuch a manner, that all the metatarſal bones excepting one were ſhattered. Proper inciſions and the other remedies already mentioned effected his cure, and reſtored him to

cured. If this officer had been ſo fortunate as to be wounded a few inches lower, he would have had the misfortune of having his arm taken off. TISSOT.

the

the nation and the army to their great joy, although the wound was of that kind, for which ſurgeons were accuſtomed to amputate not above fifty years ago ‡.

SECT. XXXVII.

I MIGHT enumerate the caſes of a great number of wounded men cured in this way, but the inſtances I have mentioned may ſuffice to make it known; I ſhall only add, that even while I am writing, there are a great many patients in the hoſpitals at Torgau, whoſe bones were ſo broken and ſhattered, that hitherto ſurgeons would not have conceived that it was poſſible to cure them without amputation, and who are all nevertheleſs in the way of recovery, by the method I have recommended. There are very

‡ *Fifty years*, a compliment which Mr. Bilguer pays ſurgeons of a more modern date.

M. le Conte de B . . . a general officer in the Auſtrian ſervice, received a wound much of the ſame kind, at Hochirken, and had the good fortune to be compleatly cured by M. Brunet, without amputation, which appeared indiſpenſably neceſſary. He only continued a little weak, which in a man of his age and conſtitution generally goes off of itſelf: He was adviſed to go to the baths at Baden in Auſtria, and on his return was ſeized with an inflammatory fever, which proved mortal. TISSOT.

few ſurgeons of the army, who have not ſeen inſtances in our hoſpitals of patients whoſe limbs were to have been cut off, where to their great dread, every thing was ready, and they placed in order to undergo the operation, when, either from their fainting or their reſiſtance, it has been put off, and recourſe has been had to the method I have juſt pointed out, by which, contrary to the general opinion, they have been cured, have ſaved their limb, and uſed it afterwards with convenience. If we compare this with what has been ſaid, § XXVII. it will readily appear, that for the moſt part it is extremely wrong to amputate the limbs.

SECT. XXXVIII.

I HAVE treated hitherto of accidents which quickly carry off the patients; I come now to conſider thoſe where the danger is not ſo preſſing, and which terminate in death by ſlow degrees, a caries of the bone, and a cancerous ſtate of the parts; for it is well known, that in theſe circumſtances amputation is often deemed neceſſary.

A caries of the bone is either ſuperficial or deep ſeated, recent or inveterate, occaſioned by

by a vicious ſtate of the fluids, or the conſequence of ſome external hurt.

When it is recent and inconſiderable, whatever be the cauſe, there is no room to think of amputation at all, but the bone muſt be laid bare according to the extent of the caries, and ſcraped with a ſcalpel, or perforated in ſundry places with the ſpike of a trepan; when the caries has gained the oppoſite part of the bone, we muſt then uſe the crown of the trepan, in order to take out the entire piece. I do not however propoſe entering into a detail of the manner of performing theſe operations.

With reſpect to the medicines proper in a caries of the bone, without the application of inſtruments, or which finiſh what the inſtruments have begun, we are furniſhed with a great many, of which it would be too tedious to give a liſt: I muſt only give a caution not to employ the mineral acids, even the anodyne mineral liquor of Hoffman, ſo much boaſted of by ſome practitioners in diſeaſes of the bones; for they all do hurt. It is well known that when theſe acids are uſed for the teeth, they whiten them, but at the ſame time deſtroy their ſubſtance, rendering them crumbly and friable like limeſtone; now the other bones being leſs ſolid

and

and hard than the teeth, there is ſo much the more reaſon to apprehend the ſame effect, by their penetrating from the affected part of the bone, where they are applied, to that which is ſound. In conſequence of this, the bones which appear mended after the uſe of theſe liquors, are, in a ſhort time, worſe than before *.

The real method of doing ſervice to bones conſumed by a caries, is like what happens to boards joined together with nails, if you make them exceſſively dry, the nails fall out of themſelves; and doubtleſs it is this notion that has given riſe to the practice of employing hot irons, and acid liquors, as driers, to promote the exfoliation of bones. But both theſe methods are attended with the inconvenience I have already mentioned; with reſpect to acids, of acting with ſo much violence on the diſeaſed parts, that they extend

* I ſaw two patients who had each of them a troubleſome caries, the one on the tibia, the other on the external protuberance of the fibula; their complaints, they told me, were of long ſtanding, and that they were cured by a travelling quack, the one in ſix weeks, the other in a ſomewhat longer time. What I learned of the colour of the medicine, its properties, and of its effects on the ailment, induced me to think it was an acid ſpirit. This incident confirms what I was told by others, and what Mr. Bilguer now remarks. Tissot.

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their action in a dangerous manner, to thoſe that are ſound. We may nevertheleſs employ hot irons with ſucceſs in conſtitutions abounding with moiſture, or when it is of conſequence immediately to ſtop the progreſs of the diſeaſe. The following medicines act efficaciouſly, but with leſs violence, frankincenſe, maſtich, myrrh, balſam of Peru, and eſſential oil of cloves; but this oil ſhould be uſed with moderation, ſince when it is employed for carious teeth, they become friable, and crumble away by degrees in a ſhort time *.

When the caries is removed, in order to compleat the cure, we ought to preſcribe a nouriſhing diet, but not too oily; broth, in which viper fleſh is boiled, is very uſeful †. The dreſſing ſhould then only conſiſt of dry

* I have ſeen ſeveral times, as well as Mr. Bilguer, the teeth crumble away by degrees, after uſing the oil of cloves; I have ſeen the ſame thing happen without the uſe either of it or of acids; I have, at other times, employed it without any ſuch effect, and although I am convinced that it does hurt ſometimes, it is only, I imagine, when the caries is very conſiderable, and the tooth much waſted: This is not, however, ſufficient reaſon to give up, entirely, a medicine often very ſerviceable in many caſes of carious teeth. Tissot.

† The indiſcriminate uſe of viper broth is not proper at all times, or in all caſes of carious bones.

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lint, taking all imaginable care to hinder the contact of the external air. When the caries is accompanied with a vitiated ſtate of the blood, the external treatment is the ſame, and ſucceeds equally, provided internal medicines, ſuitable to the nature of the ailment, be joined with it; with this precaution, a caries from a venereal cauſe, may be cured like any other.

SECT. XXXIX.

IT will certainly be aſked, What muſt be done when the beſt applications fail, and muſt we not amputate when the caries is very extenſive? I anſwer, that amputation is to no purpoſe if the caries be attended with a bad habit of body, and while the morbid cauſe remains; when this is removed, we ought not to deſpair of a cure, although the greater part of the bone be carious, as the caſes I have already related plainly demonſtrate *. We ought therefore to try other means, and trepan the bone in ſeveral places, till whatever is rotten be taken

* The obſervations of M. Muzel, p. 83. confirm my opinion, where he ſays, that all thoſe on whom amputation was performed on account of carious bones, died in conſequence of it.

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away. There are many bones, whereon amputation, even if it were of uſe, is not practicable; if, for inſtance, the caries has attacked the upper parts of the humeral, or thigh-bone, the jaw-bone, &c. The method of treating the diſeaſes of the bones, may be learned from the caſes of ſo many ſoldiers wounded at the articulations of the elbow, knee, &c. and who, by the care beſtowed on them in our hoſpitals, had their limbs ſaved, notwithſtanding they loſt very large pieces of bone; ſome of which were ſeparated by nature, and ſome by the help of the ſurgeon: And as no perſon will deny that the wounds made by a ſurgeon, with an exceeding ſharp inſtrument, and with much circumſpection, in order to remove the pieces of corrupted bone, are more eaſily cured than wounds that are lacerated and contuſed, by means of a ball, grape-ſhot, or ſplinters, &c. If the habit of body allows of any hope of curing the caries, the method I have pointed out § XX. may alſo be practiſed in this caſe. It is true, the limb often remains deformed after it, but this does not always happen; and frequently the callus fills up the whole vacuity left by the part of the bone which is taken out, however conſiderable it may have been. We read of ſucceſsful cures, where even the loſs of the entire bone has been ſupplied by means

of a callus *; beſides, the deformity of the limb does not take away the total uſe of it †.

SECT. XL.

IT now remains, that I ſhould ſay ſomething concerning cancers; on which ſubject I ſhall be brief, as it has been treated of by very able hands *. If the complaint be re-

* Such is that mentioned by Sculteſus, *Armentar. Chirurgicum, obſ.* 81. in which we ſee a callus ſupply the place, not only of the tibia, but alſo of a part of the fibula, which he had extracted, and at the cloſe of the cure, the patient walked without the help of a ſtaff.——See alſo the Medical Eſſays of Edinburgh, vol. i. p. 312.——*Uberſatzt durch D. Carl. Criſtian Krauſen, p.* 51. And the ſame Eſſays, vol. v. p. 371. mention one much more ſurprizing, "for the whole ti-"bia of one leg came out, and the tibia of the other leg "ſeparated in ſmall pieces. Nevertheleſs the patient, "who was a boy of 10 or 11 years of age, in four "months was able to walk without crutches, with his "legs ſtraight, and continued well afterwards, and "fit for country work." Theſe caſes are ſo much the more deciſive in favour of the method I employ, as the callus much more eaſily repairs the fragments of bone taken away by the ſurgeon after an external hurt, and where there is no morbid cauſe, which was very conſiderable in the caſe I have cited.

† See § XXXVI.

‡ See the Diſſertation of M. Kattſchmied, on this ſubject.

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cent, the conſtitution good, if internal medicines and outward applications have produced no effect, the vitiated part muſt be extirpated before the diſeaſe takes root, and communicates the infection farther. But the greater number of thoſe who have the misfortune to be attacked with this diſeaſe, putting off the amputation from time to time, it happens when they do reſolve on it, either that it accelerates their death, or the humour falls upon another part: For this reaſon, the operation for extirpating it, ſhould be performed much more ſeldom than it is *; and it were greatly to be wiſhed, that phyſicians would endeavour to find out ſome remedy for this horrid diſeaſe, without having recourſe to amputation; but it is not my intention to dwell on this topic.

* When the cancer is evidently the conſequence of an external accident, neglected or injudiciouſly treated, amputation performed in time, may effect a cure; but when the diſeaſe has come on gradually, without being able to aſſign any external cauſe for it, I have almoſt conſtantly obſerved, although it be performed in time, it accelerates the patient's death; and ſometimes after having been made undergo a degree of torture more painful than that of the cancer itſelf. It is hoped, that the virtues of hemlock will make the frequency of amputation in theſe caſes be diſcontinued: It appears, however, by the concluſion of the ſection, that Mr. Bilguer had not ſeen Dr. Stork's pamphlet.

SECT.

SECT. XLI.

I HAVE now finiſhed what I had moſt material to ſay, againſt the practice which ſtill prevails, of too precipitately taking off the limbs when they are contuſed or ſhattered.

Are my reaſons well-founded, or does the method I propoſe deſerve to be adopted? This I leave to be determined by the judicious reader; for my own part, I ſhall never experience any ſenſation more agreeable, than the recollection of having ſaved the lives and preſerved the limbs of ſo many unfortunate men in our hoſpitals, whoſe wounds were of the kind for which practitioners hitherto have had recourſe to amputation; and it were to be wiſhed, that ſo many cures happily effected, might repreſs that kind of folly, by which, in ſome countries, ſurgeons are excited, and even encouraged by public rewards, to perform frequent amputations. Another advantage will accrue from this publication, which is, that all thoſe who judged unfavourably of the ſurgeons of our hoſpitals, on hearing they never employed amputation, will, I hope, lay aſide their prejudices on this ſcore, and may even derive benefit from our example.

FINIS.

MVSEVM BRITAN NICVM